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SYSTEM

OF

SURGERY:

BY

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A

SYSTEM

OF

SURGERY.

CHAPTER XXVI.

Of the Varicocele, Circocele, Spermatocele, and Pneumatocele.

BY the term Varicocele, is meant a varicose distention of the veins of the scrotum, which in this state form a tumor of hard knotty inequalities, seldom attended with pain, and commonly productive of no inconvenience, if it be not from its bulk.

The Circocele is a tumor of the ſpermatic cord, extending from the ſuperior part of the ſcrotum to the abdominal muſcles, and is produced by a varicoſe diſtention of the ſpermatic vein.

Theſe tumors are occaſionally produced by preſſure on the courſe of the veins; but we are ſeldom able to diſtinguiſh the cauſe of it, in which caſe, we conclude, that they ariſe from debility or relaxation in the veſſels in which they occur.

When tumors in the courſe of the veins are perceived to give riſe to theſe tumors, or when the preſſure of a hernial truſs upon the ſpermatic cord appears to have produced them, the removal of this evident cauſe of the diſeaſe, ſhould be the firſt attempt towards a cure.

When produced by the preſſure of a truſs, or of any other ſimilar cauſe, an alteration in the bandage will ſometimes remove them. When the preſſure of ſchirrous tumors give riſe to them, theſe muſt be extirpated when it can be done with ſafety;

ſafety; and when produced by tumors tending to ſuppurate, warm emollient applications will be the moſt uſeful remedy.

But when a general relaxed ſtate of the veins appears to be the cauſe of their diſtention, ſuch remedies ſhould be employed as will moſt effectually recover that tone of which they have been deprived by the long continuance of the diſeaſe. With this view, nothing commonly anſwers ſo well as the uſe of a proper ſuſpenſory bandage, and the application of a ſolution of alum, a ſolution of crude ſal ammoniac in vinegar, and other aſtringents, to the parts affected.

By due attention to this kind of management, the increaſe of almoſt every tumor depending upon this cauſe, may be prevented; and ſo much relief will be thereby obtained, as to render the harſh remedies of the knife, the cautery, and ligature, recommended by ancient writers for the removal of theſe tumors, altogether unneceſſary.

By the Spermatocele, is meant, a morbid diſtention of the epididymis and vas deferens, produced, as is ſuppoſed, by a ſtagnation of ſemen. This may ariſe from tumors, ſtricture, or inflammation about the caput gallinaginis, or in the courſe of the vas deferens; but there is reaſon to think, that it is moſt frequently induced by inflammation.

When produced by inflammation, general and topical blood-letting, gentle laxatives, a low cooling diet, and reſt of body, will commonly prove the moſt uſeful remedies, and of theſe none are more to be truſted than topical blood-letting with leeches, which ſhould be repeated from time to time, according to the urgency of ſymptoms. And again, when tumors are diſcovered to preſs upon the vas deferens, they ſhould either be brought to ſuppurate, or removed with the ſcalpel, when it can be done with ſafety. At other times theſe tumors are connected with lues venerea; in which caſe, a well-directed

ed courſe of mercury will be moſt likely to anſwer.

By ſome we are told, that all the other means having failed, caſtration has at laſt been found requiſite.

This, however, I can ſcarcely ſuppoſe to be neceſſary in any caſe; at leaſt I never met with an inſtance of its being ſo.

The term Pneumatocele, is applied to ſignify a diſtention of the ſcrotum by a collection of air.

This has been deſcribed by moſt of the ancient writers as a frequent occurrence; but there is much reaſon to think, that a great proportion of all the tumors which they deſcribe as containing air, were either formed by collections of water, or by the protruſion of ſome of the bowels. That ſpecies of hernia to which young children are liable, is to this day, by our common people, termed a wind-rupture, as is the caſe with all thoſe collections of water in the ſcrotum, with which new-

born infants are affected. But we know well, that none of theſe tumors are formed by air; and that their contents are of a very different nature.

In wounds of the lungs, air is ſometimes thrown into the ſurrounding cellular ſubſtance, and in that way paſſes into the ſcrotum, as it does in particular inſtances over the whole body; and in high degrees of putrid diſeaſes, ſo much air may be ſeparated from the blood, as to diſtend the cellular ſubſtance of the ſcrotum, as well as of other parts. But a real pneumatocele has never probably exiſted as a mere local affection of the ſcrotum; at leaſt I have never ſeen it.

In the caſe of air ſpreading to the cellular ſubſtance of theſe parts, as a conſequence of a wound of the lungs, the ſame remedy proves effectual that we employ for anaſarcous ſwellings formed by water, to wit, ſmall punctures with the point of a lancet, which are found to be ſufficient for diſcharging great quantities of air.

air. But whenever the diſeaſe is induced by ſuch a degree of putreſcency in the ſyſtem, as excites a ſeparation of air from the blood, there can be little reaſon to look for advantage from any means that can be employed.

CHAPTER XXVII.

Of the Sarcocele, or Schirrous Teſticle.

THE term Sarcocele, implies a firm fleſhy enlargement of the teſticle: A ſimple inflammatory ſwelling of the teſtis affords a tumor of ſome degree of firmneſs; but the true ſarcocele, or ſchirrous teſticle, is attended with a hardneſs altogether unuſual in the real hernia humoralis, or inflamed teſticle.

A ſchirrous teſticle, in the courſe of its progreſs, puts on ſuch a variety of appearances, as renders it difficult, by deſcription, to give an adequate idea of it. In general, however, the acceſſion and progreſs of the diſeaſe is this:

An unuſual degree of hardneſs, attended with ſome enlargement of the teſtis, is the firſt indication of the diſeaſe. The parts

are

are not at firſt diſcoloured, nor is there any material degree of pain. In a gradual manner, the tumor acquires a larger ſize. At firſt, it is ſmooth and equal, but, on becoming larger, it alſo becomes harder and knotty or unequal on the ſurface: Slight pains are felt in every part of it; and if it be not ſuſpended, the patient complains of uneaſineſs in his back.

When the conſtitution is ſound, the diſeaſe will occaſionally remain in this ſituation for a great length of time; and, in ſome inſtances, by moderate diet, keeping an open belly, ſuſpending the tumor properly, and avoiding violent exerciſe, it has not only been prevented from increaſing, but, in a gradual manner, has been diſcuſſed. This favourable termination, however, it muſt be owned, is exceedingly rare; for inſtead of remaining ſtationary, the diſeaſe in general becomes worſe. It acquires a larger ſize; becomes ragged, and more unequal on its ſurface; and the pain, which at firſt was trifling, becomes more

more ſevere, darting, in ſmart ſtings, through every part of the tumor.

The inequalities on the ſurface of the tumor by degrees increaſe. In ſome inſtances, a conſiderable quantity of ſerum is extravaſated into the tunica vaginalis, which, to thoſe who are not verſant in the treatment of diſeaſes of this kind, gives the tumor the appearance of a common hydrocele; and, at other times, inſtead of ſuch depoſitions into the vaginal coat of the teſticle, partial collections of matter take place through the whole body of the tumor. Theſe by degrees increaſe, and the ſcrotum, which till then had been gradually diſtending, at laſt burſts, and a diſcharge takes place from the various collections in the body of the tumor, of a thin, fetid, bloody matter.

In ſome inſtances, the ſpermatic cord becomes hard and enlarged ſoon after the commencement of the diſeaſe; but this does not commonly happen till the tumor has acquired a conſiderable ſize, and moſt frequently,

frequently, I have obſerved, not till matter has formed in it.

On the teſtis increaſing in bulk, this affection of the cord alſo becomes worſe. From being at firſt only ſlightly tumefied, it gradually turns more hard and ſwelled; it becomes ſo painful, that the patient cannot bear to be touched, and knotty or unequal through the whole extent of it.

The diſcharge from the openings in the ſcrotum ſtill continues; but although the quantity of matter is increaſed, the ſize of the tumor is not thereby diminiſhed. It rather continues indeed to increaſe, the edges of the ſore become hard, livid, and retorted, and fungous excreſcences puſh out from different parts of it.

Whatever was the ſtate of the patient's health on the firſt attack of the diſeaſe, in this advanced ſtate of it, it is always much impaired. He now becomes emaciated, of a pale, wan complexion, and the diſeaſe, which, in this ſtage, is a real cancer of the moſt malignant nature, turning ſtill more virulent, by the pain becoming

ing more tormenting, the patient is at laſt carried off in much miſery.

Such, in general, is the progreſs and event of this dreadful diſeaſe, if not interrupted by the extirpation of the teſtis, before it has gone too far. I have already obſerved, that it exhibits a great variety of ſymptoms. Thoſe I have enumerated occur moſt frequently; but no deſcription can convey a clear idea of all the appearances that it aſſumes.

In ſome, as I have obſerved above, it remains apparently in an indolent inactive ſtate, for a great length of time, even for years; and, in others, it proceeds ſo rapidly, that, in the ſpace of a few months, I have known it paſs through all the changes I have enumerated.

Nor is any age, temperament, or line of life, exempted from it: It happens equally to the opulent and to the moſt indigent; and I have met with it in all ages, from the ſixteenth to the ſeventieth and eightieth year, but not ſo frequently in early youth, as in more advanced ſtages of life.

In

In a great proportion of caſes, the diſeaſe begins in the body of the teſtis, affecting the whole of it equally; but, in ſome, it makes its firſt appearance in the epididymis, and occaſionally even in the ſpermatic cord. It has been a prevailing opinion, indeed, that a ſchirrous hardneſs, tending to cancer, never begins in the epididymis, and that the teſticle is always firſt affected.

This is certainly in general the caſe, but every practitioner muſt, at times, have met with inſtances of cancer beginning in the epididymis, and ſometimes even in the ſpermatic cord, and ſpreading from thence to the neighbouring parts. I might here inſert different caſes which have fallen within my own obſervation; but Mr Pott's collection furniſhes a ſufficient number of well-marked examples *.

In almoſt every caſe of ſwelled teſticle from gonorrhœa, the epididymis is not only affected before the teſticle, by the inflammation

* Treatiſe on the Hydrocele, caſes 42. 48. and 49.

inflammation ſpreading from the urethra, along the vas deferens; but the ſwelling, when it begins to yield, always firſt removes from the teſticle, leaving, in general, a hardened ſtate of the epididymis, which, for the moſt part, continues in ſome degree during life. But, as the hardneſs produced in this manner is entirely the effect of inflammation upon a membranous or vaſcular part, ſo here, as in other parts of the body, of a ſimilar texture, we ſeldom find that hardneſs induced by inflammation terminates in cancer.

The contrary, however, of this has been inculcated; and it has even been ſaid, that the hernia humoralis produced by gonorrhœa, and that tumor of the teſtis which we ſometimes meet with from lues venerea, are frequent cauſes of ſarcocele; which in various inſtances has done harm, by tending to prevent a trial of mercury, the only remedy which, in tumors of the teſtis ariſing from this cauſe, has ever as yet proved of any real utility.

But,

But, although tumors of the teſtis, from a venereal cauſe, ſeldom terminate in this manner, yet I will not go ſo far, as to ſay that they never have done ſo; for I know, that a hardened ſtate of the teſtis and epididymis produced originally from a venereal taint, does, in ſome inſtances, degenerate into the worſt ſpecies of ſarcocele. That is, that although tumors in this part, ariſing from lues venerea, are moſt frequently cured by mercury, yet occaſionally, and in particular conſtitutions, the peculiarities of which, however, we are not acquainted with, they do certainly end in ſchirrus of the worſt kind, a diſeaſe which might never probably have appeared, if the original veneral taint had not acted as an exciting cauſe of it. We know that a prediſpoſition to diſeaſes will remain long in a latent ſtate in the ſyſtem, without any evident ſymptom being excited, till the application of ſome particular ſtimulus brings it into action. In the ſame manner, a venereal affection of the teſtis, or even that hardneſs of the epididymis that remains

mains after an inflammatory tumor of theſe parts from gonorrhœa, will, in ſome conſtitutions, terminate in ſarcocele, although, in a great proportion of caſes, it is otherwiſe, and no diſtreſsful conſequence reſults from them.

I have dwelt the longer upon this, from a contrary doctrine having been ſtrenuouſly inculcated by one whoſe authority is deſervedly great, and whoſe obſervation in this diſeaſe has led to the concluſion he endeavours to eſtabliſh *. But, as the reſult of my experience has been exactly what I have ſtated, I could not avoid ſpeaking of it in the manner I have done.

In the treatiſe to which I allude, we are told, that hernia humoralis is never productive of ſarcocele. If, on this ſubject, Mr Pott's idea is juſt, it ought undoubtedly to be received; but, if it is not, it may certainly do harm, by rendering both patients and practitioners more remiſs in caſes of ſarcocele proceeding from this cauſe, than they otherwiſe would be; as,

* Mr Pott, Treatiſe on the Hydrocele, &c. p. 232.

as, by continuing ſtill to expect that a mercurial courſe may accompliſh a cure, they may allow the diſeaſe to go too far before extirpation is adviſed.

In every doubtful caſe, when lues venerea is ſuſpected to be the cauſe of the tumor, blood-letting, when the pulſe is full, an open belly, a cooling diet, a horizontal poſture, a proper ſuſpenſory bandage, and a well-directed courſe of mercury, will commonly remove it. But, when theſe means are employed without advantage; and eſpecially if, during their application, the tumor, inſtead of decreaſing, becomes gradually worſe, as ſoon as, from its increaſe, there appears to be any riſk of its advancing too far to admit of being extirpated, it ought, without further heſitation, to be removed, whatever the cauſe may be by which it was at firſt produced.

Among other cauſes which authors have mentioned of ſarcocele, is the hydrocele of the tunica vaginalis. From quantities of a ſerous fluid being frequently found in the vaginal coat of a ſchirrous teſticle, it

has been ſuppoſed, that the water, in ſuch caſes, was the original cauſe, and not the effect of the diſeaſe in the teſtis. There is much reaſon, however, to think, that in theſe collections of water in the tunica vaginalis, in which the teſtis is found diſeaſed, that the hardened ſtate of that organ ought to be conſidered as the original diſeaſe, and not the water which ſurrounds it.

Collections of water are, no doubt, often met with, even in a real ſarcocele; but this we are to conſider entirely as a different ſtage of the ſame diſeaſe: For, although the true ſarcocele is not at firſt attended with any collection, either of blood or ſerum, it is natural to ſuppoſe, that an enlarged or hardened ſtate of the teſtis muſt have ſome influence, both on the quantity and appearance of the fluid with which the tunica vaginalis is always provided.

If it either excites an augmented ſecretion, or a diminiſhed abſorption of this fluid, a dropſical ſwelling muſt take place:

and

and every ſuch collection combined with a ſchirrous teſticle, has been very properly termed a hydro-ſarcocele.

That the teſtis, by remaining long immerſed in the ſerum even of a true hydrocele, is frequently altered in its texture, there is no reaſon to doubt. Thus, on laying open the tunica vaginalis in a common hydrocele, the teſtis is very commonly of a more pale appearance than in a ſtate of health.

In ſome caſes, it is much diminiſhed, and, in others, conſiderably enlarged; but all ſuch enlargements, when connected with a real hydrocele, are of a ſoft, harmleſs nature, and never give pain. In this ſtate, the teſtis ſhould never be extirpated.

This is a point, I may remark, which it is of much importance to aſcertain: For, on the idea of this enlargement of the teſtis, frequently connected with, and perhaps produced by immerſion in the water of a hydrocele, being truly ſchirrous, the operation of caſtration has been often ad-

viſed, and unfortunately practiſed. In circumſtances of doubt, the means of diſtinction between the mild and malignant variety of enlarged teſticle, by which we ſhould in general be directed, are theſe: When either the body of the teſtis or epididymis, or both, are hard and enlarged previous to any collection of ſerum in the tunica vaginalis, ſuch collections as afterwards take place ought not to be conſidered as conſtituting a ſimple hydrocele. If the tumor has been accompanied with pain, and if, upon diſcharging the ſerum by inciſion, the teſtis, beſides being enlarged, is hard or ulcerated on its ſurface, extirpation ſhould be immediately adviſed; but, on the contrary, when the water of a hydrocele is known to have been collected while the teſticle remained ſound, and of its natural ſize, whatever enlargement it may be found to have acquired on laying the ſac open, if the teſtis is neither of a ſchirrous hardneſs, nor affected with pain or ulceration, we ought unqueſtionably to proceed as in a caſe of ſimple hydrocele;

drocele; for, this kind of enlargement will be rarely found to excite future uneaſineſs, and will conſequently ſeldom or never render extirpation neceſſary.

In judging of the probable termination of a ſchirrous teſticle, different circumſtances require attention: The age and habit of body of the patient, the duration of the diſeaſe, and the ſtate it is in at the time.

Thus, whatever treatment is to be adopted, more ſucceſs may be reaſonably expected in a young healthy perſon, than in the reverſe; particularly if extirpation of the teſtis is to be adviſed. In patients that are otherwiſe in good health, the chance of ſucceſs from the operation is commonly conſiderable, provided the diſeaſe is not too far advanced; whereas, in old or infirm people, and in habits attended with pale, wan complexions, with indigeſtion, and other ſymptoms of obſtructed viſcera, whatever ſtate the diſeaſe may be in, little or no advantage is likely to accrue from any operation.

The complexion, of itſelf, I muſt obſerve, does not, in this diſeaſe, merit much attention; for, I have ſcarcely met with an inſtance of the true ſarcocele, even in the early and moſt ſimple ſtage of the diſeaſe, in which a pale complexion did not take place. It ſeems to be, in a great meaſure, the effect of that anxiety and dread for the final event of the diſeaſe, to which patients, with tumors of this deſcription, are particularly liable; but it is materially different from that wan, ſickly countenance, often accompanied with a ſlight tinge of bile, that we meet with in the advanced ſtate of the diſeaſe, when attended with obſtructions of any of the abdominal viſcera.

With reſpect to the duration of the diſeaſe, if it has already ſubſiſted for a conſiderable time without making progreſs, there will be reaſon to think that it is of a mild nature, and that the ſyſtem is not ſo much affected as if its progreſs had been great and rapid; and, laſtly, the ſtate of the tumor at the time is of much importance

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in forming a prognoſis of the event. As long as the teſticle is only ſomewhat hard and enlarged, without the formation of matter, and without any diſeaſe of the cord, if the conſtitution is otherwiſe healthy, there will be much cauſe to hope for a favourable event from any operation that is adviſed.

But, on the contrary, when the diſeaſe is ſo far advanced, that collections of matter have formed, either upon the ſurface of the teſticle, or in its more internal parts, as in this ſtate there will be cauſe to ſuſpect that the conſtitution has ſuffered from abſorption, ſo there will be leſs cauſe to hope that the operation will prove ſucceſsful, than in the more early ſtages of the diſeaſe. And this is more remarkably the caſe, when ulcerations have taken place on the ſurface of the tumor; for we know well that abſorption is much more apt to occur from tumors in a ſtate of ulceration, than from matter to which the air does not get acceſs.

In whatever ſtate, however, the tumor may be, there is always reaſon to hope for more ſucceſs from the operation while the ſpermatic cord is yet ſound, than when it has become diſeaſed; for, as ſoon as the cord is much affected, the chance of ſucceſs from any means that can be attempted, will be proportionally leſs. The cord, indeed, may, towards its under extremity, be diſeaſed, even in the ſame manner with the teſtis itſelf, without leſſening the chance of benefit from the operation; but, whenever the diſeaſe has ſpread ſo far up the cord as to render it doubtful whether the parts affected can be all removed by the knife or not; and eſpecially, if there is reaſon to think that the cord is diſeaſed within the boundaries of the abdomen, inſtead of there being, in ſuch circumſtances, any advantage to be expected from the operation, every attempt towards the removal of the parts below, will, for certain, tend to aggravate the ſymptoms, and haſten the death of the patient.

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When a ſchirrous or cancerous tumor is ſo ſituated, that it can be entirely removed, the operation ought immediately to be adviſed; but, when the diſeaſe has advanced ſo far as to render this impoſſible, in whatever part of the body it may be ſeated, no attempt of this kind ſhould be made, the fact being now clearly aſcertained, that cancerous affections are always rendered worſe by extirpation, when all the diſeaſed parts cannot be removed.

It is of much importance, however, to obſerve, that the ſpermatic cord frequently becomes full and thick, merely by the weight of the tumor, without being in any other reſpect diſeaſed. A fulneſs of this kind, when the cord itſelf is not painful, and when no knots or inequalities have formed upon its ſurface, ought not to prevent the operation, when, in other reſpects, it appears to be neceſſary; for, a mere enlargement of the cord very frequently occurs, either from a varicoſe ſtate of the veſſels, or from a watery depoſition in the cellular ſubſtance

ſubſtance of the part, when it is not in any other manner diſeaſed *. But, when the cord, at the ſame time that it has become enlarged, hard, and knotty, adheres to the neighbouring parts, is painful to the touch, or ulcerated, theſe, if the diſeaſe extends over the whole proceſs, up to the abdominal muſcles, are circumſtances which, with every prudent practitioner, will, at all times, forbid the operation of caſtration.

It has, indeed, been propoſed, in this ſtate of the cord, to enlarge the opening in the external oblique muſcle, ſo as, by diſſection, to trace the diſeaſed parts even into the cavity of the abdomen, with a view to remove them entirely. But, although theoretical writers may attempt to amuſe their readers with ſuch propoſals, they will never be ſeriouſly thought of by practitioners whoſe opportunities for obſervation

* Of the point here inculcated, ſome ſingular proofs are recorded by Mr Pott, in his uſeful collection of caſes. See Treatiſe on the Hydrocele, Caſes XXXIX. XL. XLIX. and L.

obſervation enable them to think and act for themſelves.

It is unneceſſary here to enumerate either internal medicines or external applications, as none have been employed with advantage for the removal of this diſeaſe. Cicuta and belladona, ſo much celebrated in cancer, have no effect in arreſting its progreſs, or in mitigating its ſymptoms. It is on the extirpation of the diſeaſed parts that we alone rely for a cure: Hence, it is a point of the firſt importance, to aſcertain the period of the diſeaſe at which the operation ſhould be propoſed.

I have already obſerved, that occaſionally we meet with a ſchirrous enlargement of the teſtis, with which patients walk about for a great length of time, with little or no inconvenience. Such inſtances, however, are rare; for by much the greateſt proportion prove to be of a malignant nature, and proceed rapidly to a ſtate of pain and hazard. I may therefore obſerve, that, whenever a ſchirrous or hardened ſtate of the teſticle does not yield

yield to the means uſually adviſed for it, ſuch as moderate evacuations of blood, when theſe are indicated, a cooling diet, a lax belly, the uſe of a ſuſpenſory bandage, and eſpecially when mercury, which, on the chance of the diſeaſe being venereal, is very commonly tried, are all uſed without advantage, we may, in ſuch circumſtances, always have much cauſe to ſuſpect that the diſeaſe is of the worſt kind. When more inveterate ſymptoms appear, when the tumor, which, till now, was in a hard indolent ſtate, becomes painful, and increaſes in bulk, no further delay ſhould be adviſed. For, however improper it would be to remove a hardened teſtis, which, for a conſiderable time, had remained indolent, without pain or increaſe, it would be equally unpardonable in any practitioner to adviſe the operation to be delayed, when matters are ſo far changed, that the tumor is attended with much pain, and daily becoming larger. In ſuch circumſtances, the ſooner the diſeaſed parts are removed, the greater will be the chance

chance of a recovery; ſo that not a day ſhould be loſt: For, whatever the opinion of the late Mr Sharpe on this point may have been, as well as of ſome others who appear to have copied from him, it has long been a fixed maxim with the moſt experienced ſurgeons, that, in all caſes of cancer, the riſk of a relapſe after the operation, is commonly in proportion to the duration of the diſeaſe *.

The extirpation of the teſticle being reſolved on, the method of doing it is this: The patient muſt be laid on a table of a convenient height, with his legs hanging down, and firmly ſecured by two aſſiſtants on each ſide; one at each arm, and another ſupporting each leg. The parts being previouſly ſhaved, if the tumor is large, an aſſiſtant muſt be employed to ſecure it; if only, however, of a moderate ſize,

* The opinion of the late Mr Sharpe, on this point, was ſingular in a man of ſuch extenſive experience. He condered the riſk of a relapſe, after the extirpation of cancerous tumors, to be greater in the more early periods of the diſeaſe, than in their more advanced ſtates. Critical Inquiry, 4th edit. p. 108.

ſize, the ſurgeon will do it beſt himſelf. With one hand, therefore, he ſhould graſp the ſwelling, ſo as to keep it firm, and with a ſcalpel in the other, an inciſion ſhould be made along the whole courſe of it, beginning at leaſt an inch above the part where the cord is to be cut, and continuing it through the ſkin and cellular ſubſtance, to the inferior part of the ſcrotum. The eaſieſt method of doing it, both for the ſurgeon and patient, is by one continued ſtroke of the knife, as it is both more quickly and more neatly performed in this manner, than in the uſual way of pinching up the ſkin between the finger and thumb, before cutting it; and there is no kind of difficulty or riſk in doing it in this manner.

The ſpermatic cord being thus laid bare, the ſurgeon, with the finger and thumb of one hand, ſhould raiſe it from the parts beneath, ſo as to be enabled to paſs a broad waxed ligature round it; which is eaſily done with a large curved needle, or even with a blunt probe, with an eye

eye at one end. With this ligature, a running knot ſhould be made upon the cord, about half an inch above where it is to be divided.

The cord being at this part cut acroſs with the ſcalpel, the teſticle is then to be entirely removed, by diſſecting the cord and it from above downwards, ſo as to ſeparate them as eaſily as poſſible from the ſurrounding parts, without injuring the ſound ſkin with which they were covered. Different inſtruments have been propoſed for facilitating the ſeparation of the teſtis from the contiguous parts; but none with which we are acquainted anſwers the purpoſe ſo well, or with ſuch expedition as a ſcalpel.

When the diſeaſed parts are removed, any arteries of the ſcrotum that have been divided, ſhould be firſt ſecured with ligatures, by means of the tenaculum. This being done, the ſpermatic artery and vein ſhould be gently ſeparated from the nerve with which they are in contact, and, by the aid of a tenaculum, ſhould be tied with

with a ſmall ligature of waxed ſilk. By including the nerve in the ligature, as is commonly done, we render this the moſt painful part of the operation, while no advantage whatever is gained by it.

The ligature previouſly paſſed round the cord, ſhould be untied; but it ſhould not be withdrawn. Leſt the ligatures of the ſpermatic artery and vein ſhould give way, this ligature ſhould be allowed to remain during the firſt eight or ten days of the cure, and, being perfectly looſe, no harm can be done by it. It is meant merely as an additional ſecurity, and to ſerve as a kind of tourniquet, in the event of any hæmorrhage taking place; ſo that, in circumſtances ſuch as we are now conſidering, it ought always to be left looſe. There is, in fact, no more neceſſity for allowing this ligature to remain tied, than for leaving a tourniquet firmly applied upon any of the extremities after the operation of amputation; and yet, inſtead of one ligature, ſuch as this, it has been the practice with many to apply two, about half

half an inch diſtant from each other; and theſe they leave firmly tied upon the whole ſubſtance of the cord during the cure of the ſore *.

There is, however, no neceſſity for this precaution, as all manner of riſk may be prevented, by ſecuring the bloodveſſels in the manner I have pointed out. I have often done the operation in this way, and no hazard has ever enſued from it. By leaving the ligature at the upper part of the wound untied, it may be made uſe of, as I have already obſerved, to compreſs the cord, in the event of the bloodveſſels burſting out again; but, when the ligature upon the ſpermatic artery and vein is properly applied, this will never happen; and when it occurs from neglect or miſmanagement, any ſevere hemorrhage may always be prevented by the ligature left for that purpoſe.

* Even the late Mr Sharpe gives theſe directions. Vide Treatiſe on the Operations of Surgery, 10th edit. p. 55.

On the arteries being tied, the edges of the cut ſhould be laid together, and ſecured with adheſive plaſter, when the retraction is inconſiderable; and, with the interrupted ſuture, when it appears from the retraction that takes place to be neceſſary. At the ſame time, care ſhould be taken to leave the ends of the ligatures employed for ſecuring the bloodveſſels, hanging out at the edges of the wound, to admit of their being withdrawn, when, in the courſe of the cure, they appear to have become looſe. The whole ſcrotum ſhould be covered with a pledget of ſoft linen, ſpread with ſaturnine cerate; and a cuſhion of tow, covered with old linen, being laid over it, the whole ſhould be ſecured with a ſuſpenſory bag, or the T bandage.

At the end of the ſecond or third day, the dreſſings ſhould be removed: It is eaſily done, when the parts are covered in the manner I have adviſed, with cerate; and it always keeps the patient more comfortable than when the firſt dreſſing is long delayed. For the ſame reaſon, the dreſſings

dreſſings ſhould be renewed daily. In the courſe of eight or ten days, the ligatures commonly ſeparate, and are eaſily taken away. About the ſame period, the ligature paſſed beneath the ſpermatic cord may be withdrawn; and, by the fourteenth or fifteenth day, the cure, when conducted in this manner, is for the moſt part complete.

Hitherto we have been ſuppoſing that the teguments covering the teſticle are ſound, in which caſe none of them ſhould ever be taken away; but, when the ſkin has become thin and inflamed, and eſpecially when any of it is in a ſtate of ulceration, all ſuch parts of it ſhould be removed along with the teſticle. In ſuch circumſtances, the beſt method of doing the operation is this: Inſtead of a longitudinal cut along the courſe of the teſticle, the firſt inciſion ſhould be carried in a ſtraight line to the under extremity of the ſpermatic cord, from whence two ſemilunar inciſions ſhould be continued to the under part of the ſcrotum, and, in

their courſe, be made to include all diſeaſed parts of the ſkin.

The remainder of the operation ſhould be finiſhed in the manner that I have deſcribed, and the ſkin included in the two ſemilunar cuts not be diſſected off by itſelf, but removed along with the teſticle.

Even where a large portion of the teguments have been removed, the ſore may be covered with ſkin; nor ſhould this ever be omitted, when we find that it can be done; for it not only haſtens the cure, but ſerves as a more firm protection to the end of the ſpermatic proceſs, ſeptum ſcroti, and contiguous parts, than the new ſcarf ſkin, with which alone they would otherwiſe be covered. But, when the remaining teguments will not ſtretch ſo much as to admit of their being retained either with plaſters or ſutures, the cure muſt neceſſarily be conducted in the uſual way, by dreſſing with pledgets of any emollient ointment, till a cicatrix is induced. The advantages, however, that we derive from being able to cover the ſore entirely with

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ſkin, are ſo great, that every operator ſhould keep it anxiouſly in view; for, beſides thoſe I have mentioned, it ſaves a great deal of pain and confinement, to which the patient muſt otherwiſe ſubmit. It admits, indeed, of a cure in the fourth part of the time commonly required when the edges of the ſkin cannot be kept together.

From the deſcriptions uſually given of caſtration, we would be induced to conſider it as one of the moſt ſimple, as well as the moſt eaſy in ſurgery; and it muſt be admitted, that, in the early ſtages of a ſarcocele, ſcarcely any difficulty ever attends it. But it is right that the younger part of the profeſſion ſhould be informed of what all practitioners of experience know, that ſcarcely any operation is productive of more perplexing occurrences in the advanced periods of the diſeaſe.

When the ſpermatic cord is ſo much diſeaſed, that we are obliged to divide it near the abdominal muſcles, if the upper part of it is not previouſly ſecured with a

ligature, it is apt to retract within the abdomen, ſo as to render it impoſſible to ſecure it in any other manner than by dividing the abdominal muſcles. Of this I have now been preſent at two inſtances, in both of which the cord retracted ſuddenly with a ſmart jerk, inſtantly on being divided.

In one of theſe caſes, no ligature had been applied, as the aſſiſtant imagined that he could ſecure the cord between his finger and thumb till the ſpermatic artery could be tied, but in which he was miſtaken; and, in the other, the ligature not being tied ſufficiently tight, it ſlipped off from the end of the cord; and, in both inſtances, the patients died of the hemorrhage. External preſſure was the only remedy that could be employed; but although in both inſtances it gave, from time to time, a temporary check to the diſcharge, it did not, in either caſe, prove effectual; ſo that, after various returns of the hemorrhage, the patients were at laſt carried off by inanition.

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In all caſes, therefore, where the cord muſt be cut in the upper part of it, a ſtrong ligature ſhould be previouſly firmly tied, as far as poſſible above the part in which the diviſion is to take place. It ſhould be applied with a running knot, and left of ſuch a length as to admit of the ends of it hanging freely out of the wound. Being made with a running knot, it may be eaſily undone, whenever it may be ſuppoſed that no hemorrhage will occur on its being withdrawn; and, if the end of the ligature is twice paſſed through the firſt nooſe, it will be ſufficiently firm.

The pain attending this mode of applying the ligature, is, no doubt, much more ſevere than when the nerve is avoided; but, in the ſituation to which I allude, where the cord is cut near to the abdominal muſcles, this cannot, with ſafety, be done, and ſhould not therefore be attempted.

In conſiderable enlargements of the teſtis, the tumor is apt to preſs ſo much up-

on the ſeptum ſcroti, and, in ſome inſtances, adheres to it ſo firmly, that the cavity of the tunica vaginalis of the oppoſite ſide is ſometimes opened in the courſe of the operation. Of this, I have been preſent at different inſtances: In ſome, no inconvenience enſued from it; but, in others, inflammation, to an extenſive degree, was induced in the correſponding teſticle. With ſufficient caution, however, in the removal of the tumor, all this may be prevented; for, however large it may be, the diſſection may be always accompliſhed without perforating the ſeptum. When it is perceived, however, that an opening is by accident made in it, in order to prevent that inflammation of the teſtis which free acceſs of air very ſeldom fails to induce, I would adviſe the divided parts to be neatly and gently drawn together with a ligature, in ſuch a manner as to admit of its being eaſily withdrawn in the courſe of the cure. By this, we alſo prevent blood and matter from finding acceſs to the tunica vaginalis.

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But the moſt diſtreſsful part of this operation ariſes from that enlarged ſtate of the arteries of the ſcrotum, which takes place in every inſtance where the tumor has acquired a great bulk, and from which practitioners occaſionally meet with more embarraſſment than is uſually experienced in any other operation. Inſtead of one, two, or three arteries, very inconſiderable in ſize, which, in the firſt ſtages of the diſeaſe, are all that we perceive; in the more advanced ſtates of it, we ſometimes meet with ſix, eight, or even more, and all or many of them, of ſuch a ſize as to require immediate attention.

In this period of the diſeaſe, the patient is commonly weak and delicate; ſo that, not being able to bear the loſs of much blood, his ſtrength would ſink, if arteries of the ſize which theſe often acquire were allowed to bleed during the remainder of the operation. During the removal of the tumor, one or more aſſiſtants ſhould be employed for the ſole purpoſe of putting a ſtop to the diſcharge, by placing

placing a finger upon every artery, as ſoon as they perceive it to be cut; nor ſhould the preſſure be removed till the diſſection is finiſhed, and the ſurgeon in readineſs to ſecure the bleeding veſſel with a tenaculum and ligature. This being done over the whole ſurface of the ſore, he next proceeds to tie the ſpermatic artery, and to finiſh the operation in the manner I have mentioned.

From want of this attention, I have known ſuch quantities of blood loſt, as have either proved quickly fatal, or induced ſuch debility and relaxation, as the patient never recovered from; and, as I have in different inſtances known even ſurgeons of experience fail in the proper management of this part of the operation, I think it right to ſay, that the younger part of the profeſſion cannot be too much on their guard in performing it.

Beſides the common form of ſarcocele, of which I have thus given an account, we find, that in workers among ſoot, the teſtis

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is liable to be attacked with cancer that firſt begins in the ſcrotum.

It firſt appears on the anterior and under part of the ſcrotum, ſometimes in the form of a warty excreſcence, and in others of a foul, ſuperficial ulcer, with hard retorted edges. From the ſuſpicious ſituation of the ſore, and from the appearances which it exhibits at firſt, it is often ſuſpected to be venereal; but no advantage is derived from mercury, nor from any dreſſings that are employed. If not prevented by early extirpation, the ulcer ſpreads over the ſcrotum, and from thence to the teſtis, ſpermatic cord, and inguinal glands; giving to the parts that it attacks all the ordinary and characteriſtic marks of cancer.

This variety of cancer appears obviouſly to be produced by ſoot; for it is found, that, beſides chimney-ſweeps, thoſe who are employed in manufactures in which ſoot enters as an ingredient, are occaſionally ſeized with it. And it alſo appears, that the ſoot acts altogether locally in producing

ducing it; for, when the ſore is extirpated early, that is, ſoon after it has appeared, and before it has ſpread over any great extent of ſurface, the diſeaſe ſeldom returns, either there or on any other part.

As no other remedy has been diſcovered, for none that I have either tried or heard of has any influence in curing the ſore, I would therefore adviſe the diſeaſed parts to be extirpated as early as poſſible. This, while the ulceration is confined to the ſcrotum, is eaſy both to the patient and ſurgeon, when compared with the operation of caſtration, which muſt always take place when the teſtis becomes diſeaſed, and is therefore a ſtrong inducement for our inſiſting that no time ſhould ever be loſt in putting it in practice.

I may further obſerve, that arſenic, cauſtic, red precipitate, corroſive ſublimate, and other irritating applications, produce the ſame effects in this as in other varieties of cancer.

When applied ſo as to remove the diſeaſed parts entirely, they perform with much

much more pain, and in a much more tedious manner, what may be more neatly done by the ſcalpel at once: While, ſo far as I have obſerved, none of them are productive of any other advantages, at the ſame time that, by the irritation which they excite, they very frequently do much harm.

Many accounts have been communicated to the public of this and other varieties of cancer being cured by eſcharotics of different kinds, and chiefly by arſenic, which appears to form the baſis of a great proportion of the remedies of this claſs, that have been employed for the cure of this diſeaſe. But, while all of theſe, as well as the internal uſe of hemlock, and of every other medicine I have known employed, have failed in every inſtance, they have very commonly had the effect of amuſing the patient with hopes of a recovery, till it has been too late even for the extirpation of the diſeaſed parts to prove ſucceſsful.

I have, therefore, no hesitation in asserting, that the operation should be advised in the early stages of the disease, and that no other remedy, with which we are yet acquainted, should ever be relied on.

Besides those affections of the testes and their coverings, that I have described, there is another, that seems to be peculiar to warm climates. It is met with frequently on the coast of Africa, and in the West Indies, in some instances in Europeans, but chiefly in Negroes.

An uniform, firm, colourless swelling attacks the whole substance of the scrotum. It is seldom, for a considerable time at first, accompanied with pain; but, when it passes from the cellular substance of the scrotum to the testes themselves, which, in some instances, happens, it, in this state, always excites a great deal of distress.

In the early stages of the disease, the external application of astringents, accompanied with a course of mercury, has, in some instances, proved useful. But, when the

the tumor has become large, a cure has never been obtained of it. In this ſituation the patient obtains no relief, but from a proper application of a ſuſpenſory bag, and, in ſevere degrees of pain, from large doſes of opium.

CHAP-

CHAPTER XXVIII.

Of the Diſeaſes of the PENIS.

SECTION I.

Of the Phymoſis.

THE glans penis is naturally provided with a covering termed the Præputium; formed by an elongation and doubling of the ſkin. This in a healthy ſtate is in general of ſuch dimenſions as to paſs eaſily over the glans, but by diſeaſe it is frequently prevented from doing ſo; and when the prepuce has got forward, and cannot

cannot be drawn back over the glans, the disease thereby produced is termed a Phymosis.

Phymosis is induced by whatever tends to swell the glans, or excite inflammation and stricture in the preputium: Hence it is a frequent consequence of gonorrhœa virulenta, and lues venerea; and it sometimes occurs from want of cleanliness, particularly in those who are naturally liable to a plentiful exsudation of viscid mucus between the glans and preputium.

Where the disease is slight, and not of long duration, fomenting the parts in any warm emollient decoction, commonly gives relief; or what answers better for such purposes than any decoction, is warm milk; this, together with the use of emollient poultices, with a view to relax the constricted preputium, often answers so effectually as to render other applications unnecessary.

At the same time that fomentations and poultices are advised, a weak saturnine solution should be injected from time to

time between the prepuce and glans, with a ſyringe, in order to waſh away any matter which by its acrimony might tend to protract the diſeaſe.

When the parts are much inflamed, blood-letting often proves uſeful. When the ſuperficial veins of the penis can be opened, any blood to be diſcharged ſhould be taken from one of them by the lancet; but when they do not appear conſpicuous, taking blood from the arm will anſwer as well as from any other part: Local blood-letting with leeches would be here particularly indicated; but when the diſeaſe has ariſen from lues venerea, the bites of theſe animals almoſt conſtantly terminate in troubleſome ſores. Together with a diſcharge of blood proportioned to the ſtrength of the patient, gentle laxatives ſhould be preſcribed, a low diet, and abſtinence from exerciſe.

When, however, it is found, that even a due perſeverance in theſe means does not remove the diſeaſe, and eſpecially if chancres are confined under the prepuce, which

which might injure the glans by the matter diſcharged from them not getting a proper vent, in that caſe it becomes neceſſary to remove the ſtricture by an inciſion carried along the whole courſe of the preputium.

As the ſkin of the prepuce is exceedingly lax, it is almoſt impoſſible to cut it with neatneſs and accuracy in the ordinary way, either with a ſcalpel or biſtoury; and when done in this manner, the ſkin yields ſo much before the inſtrument, as always to render the operation tedious and painful: Neither are the probe-ſciſſars well calculated for doing it properly, as the parts are commonly ſo much thickened by inflammation, that they cannot be rightly cut with ſciſſars.

Theſe inconveniencies being obvious, many inventions have been propoſed for doing the operation more eaſily. In Plate LXVIII. figures 1. 2. and 3. is repreſented an inſtrument which I made for this purpoſe ſeveral years ago, and it an-

ſwers the intention very effectually, and with much eaſe.

It conſiſts of a director, fig. 2. with a ſmall curve at its extremity, to which a ſharp-pointed biſtoury, fig. 1. with a narrow blade, is ſo exactly adapted, as in fig. 3., that the cutting part of it is entirely concealed in the groove of the director, which ought to be about a quarter of an inch longer than the blade of the knife.

The knife being inſerted into the director, ſo as to be covered by it entirely, the inſtrument in this ſtate is to be paſſed between the prepuce and glans on one ſide of the penis, till the director is found by the finger to have reached the upper end of the preputium. The operator is now to keep the director firm with one hand, and with the other is to puſh the knife forward, ſo as to make its point paſs through the prepuce; and the director being withdrawn, the operation is finiſhed by drawing the knife forward, ſo as to make

make it divide the prepuce through its whole length along the ſide of the penis.

In this manner the preputium is preſerved in a tenſe ſtate, while the diviſion is going on, by which means the operation is accompliſhed with eaſe: And, by dividing the preputium on one ſide, we more readily avoid the large veins of the penis, at the ſame time that the matter proceeding from the cut is more eaſily diſcharged, than when the operation is done on the back-part of the penis.

The prepuce being thus divided, the parts ſhould be bathed with warm water, ſo as to waſh off any acrid matter with which they may be covered; and this being done, the ſore ſhould be covered with ſoft lint; and a compreſs of old linen being laid over it, the whole may be eaſily retained by a ſmall linen bag adapted to the ſize of the penis, to be ſecured by two ſtraps pinned to a circular bandage made to ſurround the body. This bag muſt indeed be always removed when the patient makes water; but this is eaſily

done; and it retains the dreſſings, not only more effectually, but with more eaſe to the patient, than is done either with adheſive plaſters or any other form of bandage.

In the after-dreſſings of the ſore, care ſhould be taken to inſert a piece of ſoft lint between the divided prepuce and glans, otherwiſe troubleſome adheſions are apt to take place. I have met with ſeveral inſtances of this, which gave much diſtreſs to the patients, and which, with due care and attention in dreſſing the ſores, might eaſily have been prevented.

It is ſcarcely neceſſary to obſerve, that when any venereal infection ſubſiſts in the conſtitution, the ſore produced by this operation will not readily heal, if the patient be not put under mercury. In ſuch circumſtances, therefore, if mercury has not been previouſly given, it ought always to be adviſed immediately on the operation taking place.

In ſome caſes of phymoſis, the preputium is ſo long, that the operation of circumciſion

cumcision answers the purpose better than a longitudinal cut. And it is easily done, by taking away all the superabundant portion of the prepuce by one stroke of a scalpel. It sometimes, however, happens, when the operation is done in this manner, that the remainder of the preputium contracts so powerfully, as to produce a good deal of distress; which can only be obviated by due attention to the after treatment of the sore, and making use of emollients, instead of astringent applications during the cure.

SECTION II.

Of the Paraphymoſis.

BY the term Paraphymoſis is meant a morbid retraction of the preputium, producing ſtricture behind the glans penis. This diſeaſe, like the former, is a frequent ſymptom in the venereal diſeaſe: but it will ariſe from whatever tends to produce, either a preternatural fulneſs in the glans, or a conſtriction of the prepuce; and more eſpecially from ſuch cauſes as induce a complication of both.

In the incipient ſtate of paraphymoſis, we may often with due dexterity and attention bring the prepuce over the glans, by puſhing the glans gently back with the thumb of each hand, while with the fingers we draw the prepuce eaſily forward.

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In the more advanced ſtate of the diſeaſe, however, no attempt of this kind ſhould be adviſed, as it is in its commencement only that it ever ſucceeds; and when it does not prove uſeful, it is apt to do harm, by inducing an increaſed degree of irritation in the parts to which the preſſure is applied.

As the paraphymoſis ſeems to be more frequently induced by an enlargement of the glans than by any original affection of the prepuce, ſo the ſtricture in the prepuce is not here ſo completely relieved by emollient fomentations, as it commonly is in phymoſis, where the diſeaſe is moſt frequently produced by a ſtricture of the prepuce alone. In paraphymoſis, indeed, warm emollients ſeem rather to do harm, as they tend evidently to increaſe the ſwelling in the glans, by which the ſtricture in the prepuce is always proportionally increaſed.

Nothing in general anſwers ſo well here as ſaturnine applications. The ſwelling, indeed, will often ſubſide by being frequently

quently immerſed in a cold ſolution of ſacchaıum ſaturni, when all other remedies fail. But, when the penis is evidently much ſwelled and inflamed, together with this application to the part, the patient ſhould be kept cool; gentle laxatives ſhould be preſcribed, and blood be taken from one of the ſuperficial veins of the penis.

By due perſeverance in theſe means, and keeping the patient on low diet, the ſtricture is frequently removed. But, when the diſeaſe proceeds to increaſe, by the ſwelling in the glans becoming more conſiderable, and the ſtricture of the prepuce increaſing, the preputium becomes œdematous, and unleſs relief be ſoon obtained by a complete removal of the ſtricture, gangrene of the glans very commonly enſues.

When, therefore, none of the remedies I have mentioned anſwer the purpoſe, we ſhould endeavour to remove the ſtricture by an operation; and the eaſieſt method of performing it is, with the ſhoulder of

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a lancet, or a ſmall ſcalpel or biſtoury, to make a deep ſcarification on each ſide of the penis, directly behind the glans; taking care to make each cut of about half an inch in length, and of ſuch a depth as effectually to divide the prepuce juſt at the ſpot where the ſtricture is moſt conſiderable.

The parts ſhould now be allowed to bleed freely, as this circumſtance of itſelf in general affords relief; and as ſoon as the flow of blood is over, a pledget of any emollient ointment being applied to the ſores, and a ſoft well-made poultice being laid over the whole, if the ſcarifications have been carried entirely through the ſtricture, nothing further will be neceſſary than dreſſing the parts daily with the ſame ointment with which they were at firſt covered: but, if the ſcarifications have not been made of a ſufficient depth, it may afterwards be neceſſary to renew them; when care muſt be taken that they are effectually done.

In

In the phymoſis, I adviſed the patient to be put under a mercurial courſe whenever there is reaſon to ſuſpect that he is infected with lues venerea; and the ſame precaution, it is evident, is equally proper in paraphymoſis.

SEC-

SECTION III.

Of Amputation of the Penis, &c.

THE penis, like other parts of the body, is liable to diſeaſes, which in ſome inſtances render amputation neceſſary.

Thus, in ſome inſtances, it is attacked with gangrene, and in others with cancer, in both of which amputation is very commonly requiſite.

I have elſewhere entered fully into the conſideration both of mortification and cancer *. Referring, therefore, to the obſervations that I had there occaſion to ſuggeſt, I ſhall at preſent only advert to the mode of amputating the penis when it becomes ſo diſeaſed as to render this operation neceſſary.

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* Vide Chap. I. Sect. IV. and Chap. V. Sect. VIII.

A circular inciſion ſhould be firſt made through the ſound ſkin at the upper end of the diſeaſed parts, when the ſkin being drawn back by an aſſiſtant, the body of the penis ſhould be cut through by one ſtroke of the ſcalpel, care being taken to remove every part that appears to be diſeaſed.

This being done, ſuch arteries as bleed freely ſhould be carefully ſearched for, and ſecured with ligatures. In general, two, and ſometimes three arteries are met with; and they ſhould all be ſecured in this manner. But even after the principal arteries have been tied, a conſiderable oozing of blood uſually continues from the ſurface of the ſore, which we ſometimes ſtop by ſprinking the whole with ſtarch or gum arabic in fine powder; but when this does not anſwer, a ſmall ſilver canula being paſſed into the urethra, and retained with a bandage, any farther diſcharge of blood may be eaſily ſtopped by ſlight compreſſion with a narrow roller on the parts that remain. A ſlight degree

gree of compreſſion anſwers the purpoſe, ſuch a degree of it, indeed, as does not hurt the parts on which it is made; and as the tube inſerted into the urethra need not be long, it is eaſily retained during the whole courſe of the cure, without either inconvenience or diſtreſs.

In Plate LXV. fig. 4. is repreſented a tube which I have in different inſtances uſed for this purpoſe. It is eaſily kept in its ſituation by fixing it with two ligatures, one on each ſide, to a narrow roller round the penis.

Heiſter, as well as others, being afraid of the hemorrhagy produced by amputating the penis, adviſe it to be done with a ſtrong ligature. A ligature being applied with firmneſs above the diſeaſed parts, they are thereby made to fall off in the courſe of ſix or eight days; but whenever a part can be eaſily removed with the ſcalpel, it is done with much more eaſe and expedition than in any other manner.

Others,

Others, again, have ſaid, that no danger is to be dreaded from any diſcharge of blood that can ever enſue from amputating the penis; but this I know from experience is not the caſe. In the courſe of a few months, I had occaſion to perform this operation three different times in the Royal Infirmary here; and, in the firſt, I was perſuaded by a gentleman who had found it in one caſe to ſucceed, not to ſecure the arteries with ligatures, but to truſt to compreſſion alone. This was accordingly done; but unfortunately, in the courſe of an hour or two after the operation, ſuch a profuſe hemorrhagy ſupervened as terminated in the patient's death.

In the next, I was reſolved to ſecure every branch of an artery that could be laid hold of. Three different arteries were accordingly tied, and no hemorrhagy enſued. In the third operation, two branches of an artery were ſecured; but a plentiful oozing ſtill continuing from the ſore, the ſilver tube above mentioned was introduced into the urethra, and

and a ſlight compreſſion being made upon it, the diſcharge was immediately ſtopped. In no other inſtance of my performing this operation did any dangerous hemorrhagy take place, and I have done it in a great many.

When all the arteries, for we frequently meet with three or four, have been ſecured in this manner, the parts ſhould be covered with pieces of ſoft lint ſprinkled with ſtarch or gum arabic in powder; and a compreſs of linen, with a hole in it large enough to paſs over the canula in the urethra, being laid over it, and the T bandage being employed to retain it, all the dreſſings may in this manner be ſecured; while the after-treatment of the ſore ſhould be ſimilar to that of wounds in any other part.

In proceeding to this operation, it ought to be kept in view, that the prepuce is frequently ſo much enlarged and ulcerated, as to give cauſe to ſuſpect that the glans as well as the reſt of the penis is diſeaſed, when in reality they are per-

fectly ſound. I was once preſent at an operation, where the previous appearances were ſuch as gave no reaſon to doubt of the glans being diſeaſed; the prepuce, with part of the penis, was accordingly taken off; when it afterwards appeared that the glans might have been ſaved, as the diſeaſe was found to be confined to the prepuce alone.

In every caſe, therefore, where we are not abſolutely certain of the glans being affected, all the diſeaſed preputium ſhould be firſt removed; and the ſtate of the parts below being examined, if they are found to be ſo much diſeaſed as to render it proper to remove them, it can be then done with as much eaſe as if they had been taken off along with the prepuce; while, on the contrary, when they appear to be ſound, the ſurgeon as well as the patient will have much cauſe to rejoice.

It ſometimes happens, that the frenum penis is ſo ſhort as to excite much uneaſineſs when the parts are in a ſtate of erection. But as no danger enſues from a diviſion

viſion of this ligament, whenever it proves troubleſome, it ought to be cut acroſs; and it is eaſily done with probe-pointed ſciſſars: After the frenum is divided, a bit of ſoft lint ſhould be inſerted between the lips of the wound, otherwiſe the parts newly ſeparated will be apt to re-unite.

In ſome inſtances, the urethra in male children is incomplete, and terminates before it reaches the point of the yard. In others no external opening can be diſcovered, while in many the urethra terminates in a ſmall opening, not large enough to admit a ſmall pin-head, at ſome diſtance from the end of the penis.

When no opening is diſcovered, if the urine is found to ſtop at any particular part, the introduction of a ſmall trocar from the point of the yard along the courſe that the urethra ought to take, and carrying it forward till it meets with the urine, will give immediate relief; and by the uſe of ſmall bougies, the ſides of the paſſage may be rendered callous, and a clear opening preſerved. But when any

opening is diſcovered, although it ſhould not be properly placed, if it affords a temporary paſſage to the urine, it is better to delay the operation till the patient is advanced in life; and on an opening being then made with a trocar in the manner I have mentioned, a piece of flexible catheter of reſina elaſtica may be introduced, not only for preſerving the paſſage free and pervious, but for carrying off the water till a cure is obtained. In the earlier periods of childhood, the ſmallneſs of parts through which a catheter ought to paſs, renders the uſe of this inſtrument altogether inadmiſſible.

Beſides the affections of the penis that we have been juſt conſidering, fiſtulous openings frequently form in the urethra, and they always give much diſtreſs. Theſe however, as well as the treatment of Stones impacted in the Urethra, will fall to be conſidered hereafter.

CHAP-

CHAPTER XXIX.

Of the STONE.

SECTION I.

General Remarks on Urinary Calculi.

PARTICLES of ſtone have been known to form in almoſt every cavity of the body, but more frequently in the organs of urine than in other parts.

The blood, as well as the ſecretions which it affords, are, by experiment, found to contain a large proportion of earth: When this earthy part of our fluids is in

the uſual quantity, and when not ſeparated by diſeaſe, it continues to circulate along with the other parts of which theſe fluids are compoſed; and in this ſtate no harm ever enſues from it. Various cauſes, however, may concur to produce a depoſition of this earthy matter from the blood and its ſecretions.

1. We know, that every liquid can diſſolve and keep ſuſpended a certain quantity, and no more, of thoſe ſubſtances of which it is a menſtruum; and it is likewiſe known, when a greater proportion than this is added, that a ſeparation and conſequent depoſition takes place of all the additional quantity. In like manner, we may ſuppoſe, if the lacteal veſſels ever abſorb a greater proportion of earthy matter from the contents of the inteſtines, than the quantity of fluids in the circulating ſyſtem can keep ſuſpended, that this ſuperabundance of earth muſt neceſſarily ſeparate from the reſt; and the depoſitions thus produced are much more likely to occur in the bladder and kidneys than in other

other parts, from the urine containing a larger proportion of earth than any other ſecretion.

2. Independent of other cauſes which may tend to induce a ſuperabundant quantity of earthy matter in the blood, ſuch articles of food as contain a large proportion of earth have been ſuppoſed to be more productive of it than others: But unleſs ſuch quantities of earth as are contained in food, be conveyed in a ſtate of the moſt perfect ſolution, any effect that may reſult from it will not be important. There is much reaſon, however, to think, that a long-continued uſe, either of water, or of wines abounding with earth in a diſſolved ſtate, has a conſiderable tendency to produce that ſtate of the blood to which I allude; of which, indeed, I could produce various facts that could not admit of diſpute.

3. Thoſe who are much accuſtomed to the uſe of ſolid food, will be more liable to the formation of a large proportion of earthy matter in the blood, than thoſe who

by a free uſe of liquids are in the habit of preſerving a more plentiful and more diluted ſtate of the ſecretions. And, accordingly, in thoſe who frequently void particles of ſand, and even ſmall calculi, I have known more advantages derived from a continued and plentiful uſe of diluent drinks, than from any other remedy. A liberal uſe of watery fluids may, no doubt, operate to much advantage, by waſhing away particles of ſand and ſtone already formed and lodged in ſome of the organs of urine; but they ſeem likewiſe to prove uſeful, merely by their diluent properties in preventing their formation.

4. A ſuperabundance of earthy matter being once produced in the blood, various circumſtances may concur to form depoſitions of it in the different cavities: Of theſe a ſedentary life is, perhaps, one of the moſt remarkable; and hence it probably is, that ſuch people are found to be moſt liable to calculous complaints, whoſe occupations require the leaſt bodily exertion.

It

It muſt, indeed, be allowed, that ſtone in the bladder is frequently met with amongſt indigent and induſtrious labourers; whoſe neceſſities, at all times, prevent their indulging in indolence. In ſuch inſtances, however, it may be ſuppoſed, that the very coarſe articles of food, with which people in this line of life are chiefly nouriſhed, will tend to impregnate the blood with ſuch a large proportion of earth, as muſt neceſſarily produce effects not to be obviated, even by the beneficial influence of a continued and regular courſe of exertion.

5. Whatever influence a prediſpoſition in the ſyſtem may have in the formation of calculus, and in its ſubſequent increaſe of bulk, the introduction of any ſubſtance that can ſerve as a nucleus, will almoſt certainly produce a ſtone, in whatever cavity it is lodged. Thus, a particle of ſand, of blood, or coagulable lymph, may, in conſequence of ſpaſm or inflammation, be confined in the pelvis of one of the kidneys, or in the cavity of the bladder, and

and may ſoon acquire ſuch a ſize, from the conſtant addition of earthy matter that it receives, as to make it impoſſible for the urine to carry it off: And urinary calculi, thus begun to be formed, will acquire, ſooner or later, a conſiderable bulk, according to the quantity of earth with which the urine is impregnated. Thus inſtances have occurred, of ſtones becoming large, in the ſpace of a few months from the firſt obvious ſymptoms which they produce; while, at other times, they have been known to remain in the bladder for a great many years, without arriving at any ſize of importance.

When ſpeaking of nuclei, it is neceſſary to remark, that their effect in the formation of calculi, in the urinary paſſages eſpecially, appears to be ſo great, that it may be doubted whether a ſtone is ever known to form in theſe parts without the intervention of this cauſe; for, however large the quantity of earth contained in urine may be, it would probably all flow off by the urethra, if it was not

not detained by the accidental introduction or formation of a nucleus.

Nuclei of different kinds, ſuch as hairs, needles, muſket and piſtol bullets, pieces of bougies, and a variety of other articles, have been met with in the centre of urinary calculi; but particles of blood, or of coagulable lymph, are moſt frequently found to produce them.

By the difference of food uſed at different periods of the diſeaſe; by the ſtone being formed ſlowly or more quickly; and, perhaps, by the intervention of other cauſes which are not always known, and which, if known, could not be eaſily explained; it commonly happens, that the different lamellæ of which human calculi are compoſed, vary conſiderably both in colour and conſiſtence; a cruſt of a ſoft friable nature being frequently known to cover one of a texture equal in hardneſs to the moſt ſolid marble; while this again is found to ſurround a ſtratum not firmer than a piece of dough.

Whatever

Whatever may be the immediate cauſe of this difference of conſiſtence in ſtones, and even of different parts of the ſame ſtone, is of little importance in practice: But we know from experience, that the ſymptoms produced by calculi formed of hard compact materials, are in general more ſevere than ſuch as ariſe from thoſe of a ſofter texture; and we likewiſe know, that the ſurface of ſtones being ſmooth or ragged, has much more influence than any other circumſtance in the violence of the ſymptoms which they produce: Much variety too, it may be remarked, is met with in human calculi with reſpect to the ſmoothneſs of their ſurfaces; ſome being perfectly poliſhed, while others are covered with hard ſharp points.

The violence of ſymptoms in this diſeaſe, is commonly in proportion to the ſize of the ſtone; ſtones of the greateſt bulk being for the moſt part attended with the moſt ſevere pain. This, however, is not always the caſe; for inſtances ſometimes occur of the moſt ſevere

ſymptoms

ſymptoms being induced by ſmall ſtones; whilſt in others, ſtones of a conſiderable ſize have been known to ſubſiſt for a great length of time without inducing much pain: But in general it is otherwiſe, and the ſymptoms are moſt frequently mild or ſevere, according as the ſtone by which they are produced is ſmall or large.

When a ſtone has acquired ſuch a ſize that it cannot paſs off from the bladder, the patient becomes liable to ſymptoms which from their commencement give much uneaſineſs, and which, in the event, commonly terminate in the moſt afflicting ſcenes of diſtreſs to which the human frame is liable.

One of the firſt ſymptoms of ſtone, is an uneaſy ſenſation at the point of the yard, which for ſome time is only diſcovered on the patient taking violent and jolting exerciſe, or immediately after voiding urine. This pain by degrees becomes more frequent and more ſevere. The patient has a ſtrong propenſity to paſs urine frequently,

frequently, and commonly voids it in ſmall quantities, perhaps even drop by drop.

When flowing in a full ſtream, it often ſtops ſuddenly; and this it is moſt apt to do when a conſiderable quantity is collected, and when of courſe the patient's deſire for voiding it is ſtrongeſt. Nor does the preſſure uſually made by the patient anſwer any good purpoſe: For, as the interruption to the flow of urine proceeds from the weight of the ſtone bearing againſt the neck of the bladder and orifice of the urethra, nothing will produce a free return of it but an alteration in the ſite of the ſtone, which more readily happens from the patient changing the poſture of his body, and particularly by the pelvis being more or leſs elevated, than by all the preſſure that he can employ for forcing it out.

The urine of calculous patients is often perfectly clear, but moſt commonly thick, and depoſites a mucous ſediment; and not unfrequently, when the diſeaſe is violent,

and

and the paroxyſms frequent in their return, it is tinged with blood. When the ſtone is large, a dull uneaſy ſenſation takes place about the neck of the bladder; and the irritation produced by it frequently excites a teneſmus, or a conſtant and painful deſire to go to ſtool.

All theſe ſymptoms are commonly increaſed by exerciſe, particularly by riding on horſeback; and from a long continuance of pain, and from that want of reſt which frequent returns of the paroxyſms induce, the patient's ſtate of health by degrees becomes impaired; and unleſs the ſtone is removed, it commonly happens that his miſery is only terminated by death.

When all or moſt of the ſymptoms that I have enumerated, occur in the ſame patient, there can be no great reaſon to doubt of the cauſe by which they are produced; and we know with certainty that they proceed from calculus, when fragments of ſtone, or ſundry ſmall ſtones, continue to paſs from time to time along with

with the urine: But when this does not occur, we can never with certainty know whether the ſymptoms ariſe from ſtone or not; for inſtances frequently happen, of all the ſymptoms uſually produced by ſtone in the bladder, ariſing from an ulcer or tumor either in the bladder itſelf, or in its neck, or even from tumors on the contiguous parts when they preſs either on the bladder or on its neck.

Practitioners accuſtomed to this branch of practice, will in general be able to judge from the ſymptoms, whether a ſtone actually exiſts in the bladder or not; but the only certain means by which it can be aſcertained, is through the intervention of a ſound or curved probe; different ſizes of which are repreſented in Plate LXIX. By paſſing this inſtrument into the bladder, in the manner I ſhall preſently mention, if it touches a ſtone, ſuch a ſenſation is thereby communicated to the operator, as gives ample conviction of the real cauſe of the diſeaſe.

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SECTION II.

Of Sounding or Searching for the Stone.

BEFORE deſcribing the operation of ſounding, it will be proper to give an anatomical deſcription of ſuch parts as are concerned in it; and to this I ſhall add an account of thoſe parts that are moſt immediately injured by the various operations of lithotomy: Theſe are, the kidneys, ureters, urinary bladder, pelvis, veſiculæ ſeminales and their ducts, proſtate gland, urethra, penis, ſome of the muſcles of the penis, and part of the abdominal muſcles.

A minute deſcription of theſe parts would lead to an extenſive diſcuſſion, inconſiſtent with the nature of this undertaking; and as ſuch a deſcription is not neceſſary, I ſhall only give ſuch an ac-

count of the parts as may ſerve to render intelligible the deſcription to be afterwards given of the operations to be performed on them.

The kidneys are two glandular bodies lying in the back-part of the abdomen, on the upper part of the pſoæ muſcles; the right being ſeated immediately below the great lobe of the liver, and the left under the ſpleen; and they are both, I may remark, almoſt completely covered by the ſlight curvatures of the inferior falſe ribs. They are ſupplied with bloodveſſels, termed the Emulgent Arteries and Veins, directly from the trunks of the aorta and vena cava. The uſe of theſe organs is to ſeparate the urine from the blood, which, as ſoon as it is ſecreted, is carried by means of two canals or tubes, one from each kidney, termed the Ureters, directly to the veſica urinaria. The ureters, after leaving the kidneys, proceed obliquely downwards behind the ſpermatic veſſels, over the os ſacrum; and paſſing in between the bladder and rectum, they are inſerted

ſerted into the former near to its neck, at a ſmall diſtance from one another; and after piercing the external coat of the bladder, they run obliquely for a ſhort ſpace between it and the more internal covering of that organ before penetrating its cavity: A conſtruction well calculated for preventing a reflux of urine to the kidneys.

The pelvis is a kind of box or baſon, formed by a conjunction of the os ſacrum, os coccyx, and oſſa innominata. The cavity formed by a particular combination of theſe parts, being intended for the protection of the bladder, and ſome other organs, is every where ſurrounded with bone, or with ſtrong ligaments, except at its upper and inferior parts, where alone the pelvis is acceſſible, being here covered with ſoft parts only. The cavity of the pelvis is chiefly occupied by the bladder, which, when in a diſtended ſtate, fills it entirely, and even aſcends conſiderably above its brim.

The bladder, or receptable of the urine, is a membranous bag compoſed of different coats, one of which is evidently muſcular, with its fibres running in different directions. The human bladder is of an irregular oblong figure. The ſuperior part of it has commonly been termed its Fundus, or Bottom: The oppoſite extremity, lying at the bottom of the pelvis, is termed the Cervix or Neck; and the intermediate ſpace, its Middle or Body. The bladder is every where nearly, though not exactly, of the ſame diameter, except at its fundus, where it is ſomewhat contracted; and again near to its neck, where it dilates conſiderably, extending back towards the coccyx.

The ſuperior part of the bladder is covered with the peritonæum; and it therefore lies, along with the other abdominal viſcera, within the abdominal cavity; but the under part of it is not covered with that membrane. The anterior under part of the bladder is connected by cellular ſubſtance to the pubes; laterally, it

it is fixed by productions of its external covering to the other bones of the pelvis; and posteriorly, it is in male subjects firmly connected with the rectum, from the entrance of that gut into the pelvis, till within a little of its termination in the anus, when the neck of the bladder and commencement of the urethra separate a little from the gut, leaving a space that is filled with fat and cellular substance.

In females, the uterus, in an unimpregnated state, lies altogether in the cavity of the pelvis, immediately behind the bladder; and the vagina, in which the os tincæ terminates, lies directly behind the urethra, and before or upon the intestinum rectum, to which it is firmly attached.

The neck of the bladder terminates in the commencement of a cylindrical membranous canal, the urethra, which comes off at nearly a right angle from the anterior part of it. The urethra, at its commencement, is surrounded by the prostate, a gland of a flat pyramidal shape, with its

baſe towards the bladder, and its apex pointing to the perinæum; its ſuperior lamella being connected with the pubes, and its inferior part with the anterior and under part of the rectum.

The urethra continues to be entirely membranous for a ſhort ſpace after it leaves the apex of the proſtate gland; and this part of it keeps in cloſe contact with the oſſa pubis, till it paſſes out from below the arch formed by theſe bones, which it does by making a curve in its progreſs to the perinæum. This curvature in the urethra it is material to be well acquainted with, particularly in the operation of Sounding. A good anatomiſt will in general paſs a ſtaff with eaſe, while thoſe not verſant in the anatomy of the parts concerned, are not only apt to fail entirely, but are ſure to give much unneceſſary pain.

The commencement of the urethra, that I have juſt deſcribed, is termed the Membranous part of it; which, before it has proceeded an inch from the extremity of the

the proſtate gland, is ſurrounded by a cellular kind of body, termed the Corpus Spongioſum Urethræ, which here forms a kind of protuberance, termed the Bulb of the Urethra; and which afterwards proceeds along in a more diffuſed ſtate to the extremity of the penis, where, by expanding again, it terminates in the formation of the Glans Penis.

The reſt of the penis is formed of the Præputium, which, as I have already had occaſion to obſerve, is merely a doubling of the ſkin; and of two round cavernous bodies, termed the Corpora Cavernoſa Penis, which originate by two crura or legs from part of the os iſchium and poſterior part of the pubes on each ſide; and having united near the ſymphyſis pubis, they thus form the principal part of the body of the penis, and are continued to the glans, with which they are connected, but with which the cellular or cavernous parts of theſe bodies have no direct communication.

By the junction of the two cavernous parts of the penis, which are nearly round, a kind of hollow is formed both above and below. In the former of theſe, or in that vacuity which runs along the back-part of the penis, the principal veins of the penis run; and the urethra is protected by the latter. The obvious uſe of the urethra is to ſerve as a paſſage for the urine and ſemen; the receptacle of the former I have already deſcribed, and I ſhall now mention thoſe of the latter. The ſemen, after being ſecreted by the teſtes, is by two very ſmall tubes, termed Vaſa Deferentia, lodged in the veſiculæ ſeminales, which are found to be two cellular kinds of canals, contorted in ſuch a manner as when diſtended to reſemble the inteſtines of a ſmall fowl. They are ſeated on the poſterior part of the neck of the bladder, below the entrance of the ureters, and lie in cloſe contact with the rectum; and the ſemen is again diſcharged from theſe receptacles by two excretory ducts, which terminate in two points, at a part which, from

from its figure, has been termed the Caput Gallinaginis, ſituated on the inferior ſide of the urethra, nearly about the middle of the proſtate gland; and a little below the entrance of theſe canals from the veſiculæ ſeminales, the two excretory ducts of the proſtate gland empty themſelves into the urethra.

The muſcles that are cut in the lateral operation of lithotomy, now commonly practiſed, are the erectores penis, acceleratores urinæ, tranſverſales perinæi, and levator ani. The erector penis ariſes from the tuberoſity of the iſchium; and, after covering almoſt completely the crus penis of the ſame ſide, it is inſerted by a tendinous expanſion into the ſuperior part of the penis, near to where it joins with its fellow of the oppoſite ſide.

The accelerator urinæ ariſes by fleſhy fibres from the ſphincter ani and contiguous ſoft parts; and after covering the membranous part of the urethra, it is inſerted into the middle of the bulb, where it joins with a ſimilar muſcle of the oppoſite

ſite ſide: Part of theſe muſcles, too, run along the crura penis, and are afterwards loſt in the ligamentous covering of the corpora cavernoſa. The tranſverſales perinæi are two thin narrow muſcles, which originate from the firm membranous covering of the tuberoſity of the iſchium, and, after ſtretching directly inwards, are inſerted into the bulb of the urethra.

Beſides theſe muſcles, which all ſuffer more or leſs in the lateral operation of lithotomy, the levator ani muſt neceſſarily be cut in the ſame operation; and in the high operation for the ſtone, part of the muſculus tranſverſalis abdominis, of the rectus, and pyramidalis, are alſo cut.

Almoſt all theſe parts are furniſhed with blood by branches from the internal iliac artery; and thoſe veſſels which run moſt hazard of being cut in the lateral operation for the ſtone, are, the arteria pudica interna, and the pudica externa; for, the former ſupplies not only the parts about the anus, but the bulb of the urethra and the corpora cavernoſa; and the latter, to wit,

wit, the pudica externa, ſupplies a great part of the bladder, the proſtate gland, and veſiculæ ſeminales.

Having thus premiſed all that is neceſſary for our purpoſe, of the anatomy of theſe parts, I ſhall now proceed to the operation of ſounding.

For the purpoſe of diſcharging water collected in the bladder, a curved ſilver tube is made uſe of, named a Catheter, different forms of which are delineated in Plates LXX. and LXXII. But for the diſcovery of a ſtone in the bladder, a ſolid inſtrument made of ſteel is preferable, as the ſenſation communicated by a firm ſubſtance is more diſtinct than when an inſtrument of ſilver, or any other ſofter material, is employed. In females, the urethra runs almoſt in a ſtraight line; ſo that an inſtrument, either perfectly ſtraight, or nearly ſo, ſuch as is repreſented in Plate LXX. fig. 3. is more eaſily introduced than one with a large curvature: But in male ſubjects, the turn made by the urethra, when it paſſes up between the rectum and

and pubes, is ſo conſiderable as to preclude entirely the introduction of a ſtraight inſtrument, unleſs much violence is uſed. By preſerving the penis at an acute angle with the body, the courſe of the urethra may indeed be rendered ſo ſtraight, that a ſtraight probe may be eaſily introduced, till it reaches this turn towards the farther extremity of the perinæum; but the curvature made by the urethra at this place, renders it neceſſary to employ an inſtrument with a correſponding degree of convexity.

The curvatures commonly given to theſe inſtruments are either too great or not conſiderable enough. Either extreme renders it difficult to obtain a paſſage into the bladder: For when the ſtaff is made with too much convexity, beſides being more difficult to introduce, it gives much unneceſſary pain, by ſtretching and even tearing the urethra; nor can an inſtrument with much convexity, be ſo eaſily managed, when in the bladder, as when the curvature given to it is leſs. In Plate LXIX.,

LXIX., ſounds are repreſented of various ſizes, and with ſuch degrees of curvature, as by experience I have found to anſwer better than any other. They are taken from the natural curvature of the urethra, the inſtruments from whence they are delineated having been exactly adapted to that paſſage, after the ſurrounding parts were removed.

The patient to be ſounded ſhould be laid upon a bed, with his head raiſed on a pillow, and his thighs ſomewhat elevated and ſeparated from each other, in which poſition the muſcles of the abdomen are put in a ſtate of relaxation. The ſurgeon, if he employs his right hand to paſs the ſtaff, ſhould ſtand on the left ſide of the patient, and the ſound ſhould be of a ſize proportioned to the paſſage intended to receive it. Having previouſly brought it to the heat of the patient's body by immerſion in warm water, and having dipped it in fine oil, he is now to graſp the penis with his left hand; and, having introduced the end of the ſound into the urethra, with its concave

concave ſide towards the abdomen of the patient, he muſt puſh it eaſily on with his right hand, while he continues with his left to draw the penis gently forward upon the inſtrument.

The ſound being in this manner carried a ſufficient length, it will commonly ſlip eaſily into the bladder; but, occaſionally, we meet with difficulty in paſſing it through that part of the urethra that is ſurrounded by the proſtate gland, the inſtrument being apt to ſtop when it comes to this part of the paſſage; and here I muſt remark, that any force employed for puſhing it further, ſhould be applied with much caution. That part of the urethra immediately anterior to the proſtate gland being entirely membranous and unſupported, if the ſound at this part meets with obſtruction, and if ſtill puſhed forward with much force, much miſchief muſt neceſſarily enſue. In this manner the point of the inſtrument is often forced entirely through the urethra; by which, inſtead of getting into the bladder, it forms an artificial paſ-

ſage,

ſage, either between the bladder and pubes, or between the bladder and rectum; an occurrence that always excites ſevere diſtreſs; and which, there is reaſon to fear, is, either from ignorance or inattention, much more frequent than it ought to be.

In order to guard againſt the dreadful conſequences that reſult from this, as ſoon as it is found that the inſtrument does not paſs eaſily along, the fore-finger of the left hand, being dipped in oil, ſhould be introduced into the rectum, when, by ſtretching the parts and elevating the point of the ſtaff, while at the ſame time the inſtrument is puſhed gently forward, we commonly procure an eaſy entrance into the bladder. By depreſſing the handle of the ſound, we alſo elevate the point of it, and in this manner its entrance into the bladder is ſometimes accompliſhed; but in general the introduction of the finger into the rectum anſwers the purpoſe.

Sounding is undoubtedly a very nice operation; and dexterity in performing it can only be acquired by much practice.

Every

Every ſtudent, therefore, ought to embrace all opportunities of practiſing it, firſt on the dead ſubject, and afterwards on the living; for every candid practitioner muſt acknowledge, that he has, in different inſtances, found the introduction of a catheter, or of a ſound, both difficult and uncertain: But when the parts concerned are not inflamed, ſwelled or ulcerated, the operation does not often miſgive in the hands of an expert ſurgeon.

The ſtaff being introduced, the operator ſhould lay hold of the handle with one hand; and if any part of it comes in contact with the ſtone, the buſineſs of ſounding is accompliſhed; and we are thus rendered certain of the nature of the diſeaſe: But if the ſtone is not ſoon diſcovered, it may commonly be found by moving the inſtrument, ſo as to make its point paſs eaſily from one ſide of the bladder to the other. When the ſtone, however, is ſmall, and has fallen into that part of the bladder that lies below the entrance of the urethra, the ſtaff is apt to paſs over it.

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With a view to obviate this difficulty, the finger of the left hand may be again introduced into the rectum, ſo as to elevate that part of the bladder in which the ſtone lies concealed. If, again, even this attempt ſhould fail, the patient's body ſhould be put into a different poſture; and no ſituation will, in general, anſwer ſo well as lowering the head and upper part of the body, while, at the ſame time, we raiſe the pelvis. In this manner a ſtone, if not contained in a particular cyſt, which it rarely is, may be moved from the projection at the neck of the bladder towards its fundus, where it will be more readily ſtruck with the ſound. But when, even by this poſture of the body, we do not ſucceed, every variety of poſition ought to be tried: The patient's head may be elevated, and the pelvis depreſſed; he may be made to ſtand erect; or, what I have ſometimes known ſucceed after other attempts had failed, he may be made to ſtand upon his feet, with his body bending forward.

It ſometimes, however, happens, when the ſtone is ſmall, and the capacity of the bladder large, that our firſt attempt in ſounding fails entirely; but when the ſymptoms of ſtone are ſtrongly marked, and when ſchirroſity and ulceration of the parts, which might give riſe to theſe ſymptoms, are not found to exiſt, we ought not to reſt ſatisfied with one, or even with two trials. I have known a ſtone diſcovered on the third or fourth ſounding, which had eſcaped the inſtrument in all the preceding trials.

When a ſtone is ſtruck with the ſtaff, the ſenſation it communicates to the operator is ſo peculiar, as to render it impoſſible for any to be deceived in it by whom it has ever been felt; but with thoſe who have not been accuſtomed to this operation, a hardened ſtate of the bladder communicates ſuch a ſenſation through the ſtaff, as frequently proves the cauſe of deception. This has even happened with practitioners of much experience and obſervation:

ſervation: It is reported of the moſt celebrated lithotomiſt of this, or perhaps any other country, that, in the courſe of his practice, which indeed was very extenſive, three patients were cut by him in whom no ſtones were diſcovered, and where a ſchirrous or hardened ſtate of the bladder had given riſe to the miſtake *. With practitioners of experience, however, this can never happen but from inattention; for I will venture to affirm, that a perſon accuſtomed to the ſenſation communicated by a ſtone, can never, if he attends to what he is doing, be deceived by the application of the ſound to a ſchirrous or any other tumor.

There being the leaſt hazard, however, of ſuch a misfortune as the one I have mentioned, namely, that of a patient being made to undergo all the pain and riſk of the operation of lithotomy, when no ſtone has exiſted, is a point of ſuch a ſerious nature, and fraught with ſuch conſequences,

* The late Mr Cheſelden.

ſequences, both to the patient, practitioner, and art of ſurgery, as ought to excite the moſt accurate attention to this part of the operation.

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SECTION III.

General Remarks on the Operation of Lithotomy.

THE preſence of a ſtone in the bladder being aſcertained in the manner I have mentioned, the means to be employed for the relief of the patient, is the next object of conſideration.

The public have at different periods been amuſed with encomiums on the lithontriptic powers of different articles, particularly of lime-water, and of cauſtic alkali in a diluted ſtate, and more lately of aërated alkaline water; but although ſome human calculi are ſoluble in all of theſe liquids, yet none of them can be conveyed in ſuch a ſtate to the bladder as to be much depended on. Many indeed have obtained relief from the uſe

of theſe remedies: The pain has, by their means, been rendered leſs ſevere, and the paroxyſms leſs frequent; but we have not one authenticated inſtance of a ſtone in the bladder being diſſolved by the uſe of theſe, or any other remedy.

As the conſtituent principles of theſe and other lithontriptic medicines, render them liable to very material changes in their circulation from the ſtomach to the bladder, it has been propoſed to convey them directly into the bladder itſelf, in order to bring them into immediate contact with the ſtone; and machines have, accordingly, been invented for the purpoſe: But, after a great many trials have been made with remedies of this claſs, it ſeems now to be admitted, that no ſolvent, powerful enough to have any effect upon a ſtone, can be injected into the bladder, but with the greateſt hazard of injuring that organ. But as ſome practitioners ſtill continue to think favourably of it, I have given a delineation, in Plate LXXIV. fig. 1. of a machine by which liquids may with eaſe

eaſe be thrown into the bladder. Every attempt, however, of this kind is now in general laid aſide; and as no dependence is to be placed upon the lithontriptic powers of any medicine taken by the mouth, the only reſource we have is, the removal of the ſtone by a chirurgical operation. In this manner, if his conſtitution is ſound, the patient may again enjoy as good health as he did before he was attacked with the diſeaſe; and unleſs the operation is performed, the remainder of a miſerable life will probably be cut ſhort by the frequent returns of pain and fever, to which people in this ſituation are conſtantly liable.

We ought, however, to remember, that although a great proportion of thoſe who are cut for the ſtone recover and do well, yet a conſiderable degree of danger always attends the operation; ſo that, before adviſing any perſon to ſubmit to it, ſuch circumſtances ought to be conſidered with attention, as can beſt enable us to form a juſt prognoſis of the event.

By experience it is found, that children more readily recover from this operation than adults; and it is likewiſe obſerved, that old people, from the fifty-fifth to the ſeventieth year, whoſe conſtitutions are not impaired, run leſs riſk from it than men in the full vigour of life. This may poſſibly ariſe from the inflammatory ſymptoms which uſually ſucceed to this operation, being more apt to proceed to a dangerous height in young plethoric people than in older patients; and we know from experience that more danger is to be dreaded from inflammation after this operation than from any other cauſe. But at whatever period of life the patient is, if he is otherwiſe healthy, more ſucceſs is to be expected, than if his conſtitution had been previouſly impaired by frequent returns of the diſeaſe; eſpecially when it has continued ſo long as to produce ulceration in any part of the bladder.

In an ulcerated ſtate of the bladder, if the patient is advanced in years, he could not expect much enjoyment of life, even although

although he were to recover from the operation: In this ſituation, therefore, a prudent practitioner would rather decline to operate: Inſtead of it, he would rather adviſe a plentiful uſe of mucilaginous drinks; an occaſional uſe of the warm bath; together with doſes of opiates proportioned to the degree of pain. By theſe means the violence of the pain is ſometimes mitigated, and the patient is thereby ſaved from the diſtreſs of a ſevere operation, the effects of which, in a conſtitution ſuch as I have mentioned, frequently prove fatal.

But even in theſe circumſtances, if the patient is young, if he is ſuffering much from the diſeaſe, and if not ſo weak as to render it probable that the quantity of blood uſually loſt in the operation may irreparably injure his health; I would decidedly adviſe the operation. His chance of recovery will, undoubtedly, be leſs than if his health had otherwiſe been unimpaired; but, if he is lucky enough to ſurvive the operation, he may enjoy life with comfort and eaſe.

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The operation being reſolved on, the next point to be determined is the beſt method of doing it. From the anatomical deſcription that I have given of the parts with which the human bladder is ſurrounded, it appears, that there are only two points at which it can with propriety be laid open. A conſiderable part of the fundus of the bladder I have ſhown to be covered with the peritonæum; ſo that to open it here, would be attended with imminent danger, from the certainty of expoſing the abdominal viſcera, not only to the effects of the atmoſphere, but to the irritation of the urine, on finding acceſs to the cavity of the peritonæum by the wound in the bladder. The poſterior part of the bladder I have ſhewn to be either immediately covered with bone, or internally connected with parts which it would be highly improper to injure; and theſe particularly are, the rectum; the veſiculæ ſeminales; and the vaſa deferentia and ureters.

The

The only parts of the bladder, therefore, which can with a chance of ſafety be cut into, are, that portion of the anterior part of it, lying immediately below the peritonæum, and which, when in a ſtate of diſtention, is raiſed ſomewhat above the pubes; where an inciſion directly above the brim of the pelvis will lay that part of it bare where it is not covered with the peritonæum, and where, accordingly, an opening into it may be made: And, again, that portion of the bladder that we term its neck, which may be opened laterally by an inciſion in the perinæum, without any danger of wounding other parts of importance.

It is in one or other of theſe parts that any opening into the bladder can be made with ſafety. Some practitioners, indeed, have attempted to cut into it at the poſterior part of its neck, or even into the body of it at once; but the hazard of wounding parts of much importance is here ſo great, that for this and other reaſons to be mentioned hereafter, every operation

ration of this kind is now laid aſide. We ſhall preſently, however, enter more fully into the diſcuſſion of this point, by giving a detail of the various means that have been propoſed, from the time of Celſus downwards, for the purpoſe of extracting ſtones from the bladder; and this I ſhall do in the order of time that theſe operations were introduced into practice.

The diſtreſs and miſery that urinary calculi excite, were probably experienced in the earlieſt ages of the world. Relief, we may therefore ſuppoſe, would be ſought for, by the removal of the ſtones, as ſoon as ſuch a knowledge of anatomy was obtained as could juſtify the attempt. We find accordingly, from the writings of Hippocrates, that even at this early period, the operation for the ſtone was frequently performed; but as it was then ſolely practiſed by a particular ſet of men termed Lithotomiſts, we have received no account from this author of their method of doing it. Celſus is the firſt who deſcribes the method of operating at the time when he lived;

lived; and it was done by making an opening in the body of the bladder, directly upon the ſtone itſelf. From the ſmall number of inſtruments uſed in this method of cutting, it has been termed the operation by the Leſſer Apparatus.

SEC-

SECTION IV.

Of the Operation of Lithotomy by the Leſſer Apparatus.

THE perſon to be cut being properly ſecured, (the eaſieſt and beſt method of effecting which, I ſhall deſcribe in Section VII.), the ſurgeon muſt dip the fore and middle fingers of his left hand in oil; and having introduced them into the rectum of the patient, he is to ſearch for the ſtone, and puſh it forward towards the perinæum, ſo that it may be felt between the ſcrotum and anus. In order to facilitate this part of the operation, and to get the ſtone properly fixed, either the ſurgeon or an aſſiſtant ſhould preſs with his right hand upon the under-part of the abdomen, at the ſame time that the ſurgeon himſelf is puſhing the ſtone forward with

with his fingers in the rectum, in which manner it is to be preſſed forward below the pubes, and ſecured on one ſide of the perinæum, between theſe bones and the anus. This being done, we are directed by Celſus to make a ſemilunar cut through the ſkin, cellular ſubſtance, and muſcles; beginning on one ſide of the anus, and carrying the cut directly over the centre of the tumor formed by the projection of the ſtone. The bladder being thus laid bare, a tranſverſe inciſion is made through the coats of it directly upon the ſtone; when the ſtone, if it is ſmall, may probably be turned out by preſſure from behind with the fingers in the rectum; but if it is large, and does not come away eaſily, we are deſired by Celſus to take the aſſiſtance of a hook for ſcooping it out.

This operation, with a few variations, continued, ſo far as we know, to be the only method of cutting for the ſtone, till the beginning of the fifteenth century, when another method of operating, to be hereafter deſcribed, was propoſed, and very

very generally adopted. Long after this period, however, this operation of Celſus was ſtill continued by many; and the eaſe with which it is accompliſhed, not only from the ſmall number of inſtruments with which it is done, but from little or no anatomical knowledge being requiſite, preſerved it in conſtant uſe with Itinerants, who continued, even to a late period, to practiſe it in different parts of Europe, under the name of the Operation upon the Gripe.

This method of cutting for the ſtone is indeed ſo eaſily performed, particularly in early infancy, that, even in theſe times, many of our well-informed practitioners have a ſtrong partiality towards it. At ſo late a period as the time of Heiſter, we find it was much in repute, inſomuch that Heiſter himſelf performed it frequently; but a wrong repreſentation has commonly been given of the parts that are cut in it; for it has been commonly ſuppoſed, that by cutting directly upon the ſtone, the bladder itſelf muſt alone be wounded, while all the

the neighbouring parts of importance are imagined to eſcape unhurt; a circumſtance that would recommend it ſtrongly, if, on experience, it was found to be the caſe. This, however, is far from being ſo; as all who will make the experiment, will readily perceive.

A ſtrict attention to the anatomy of the parts, might at once indeed convince us of the difficulty, if not of the abſolute impoſſibility, of cutting from the perinæum directly upon a ſtone in the bladder, without deſtroying either the vaſa deferentia, veſiculæ ſeminales, or excretory ducts of thoſe receptacles; the deſtruction of which would produce the uſual effects of caſtration with as much certainty as a total extirpation of the teſtes themſelves. Theſe parts are all placed upon the under and back part of the bladder; and as they, as well as the ureters, are immediately connected with that part of the bladder that is cut in this operation, it is perhaps impoſſible to perform it without dividing one or all of them.

As I had once a favourable opinion of this operation, I thought that in ſome inſtances it might be uſefully employed, if, on experience, it ſhould appear that theſe parts could be avoided with the ſcalpel. I accordingly put it frequently in practice on dead ſubjects; but although in all of them it was done with every poſſible attention, it was conſtantly found either that the veſiculæ ſeminales were divided, or that their excretory ducts were cut acroſs. This, however, was not all; for although in ſome inſtances the urethra was not touched, yet in others it was found to be completely laid open before the ſcalpel reached the bladder. In every inſtance where the operation is performed in the manner directed by Celſus, the urethra muſt neceſſarily be cut, before the inſtrument reaches the bladder. For it is altogether impoſſible to make a tranſverſe inciſion into the bladder, in the manner adviſed by Celſus, without previouſly paſſing through part of the urethra; the fartheſt extremity of that canal being

being always puſhed forward by the fingers in the rectum, in ſuch a manner as to render it impoſſible to avoid it in this method of performing the operation.

But in moſt of the trials that I made upon dead ſubjects, for this purpoſe, I attempted what I conſider as a material improvement of Celſus's method. A tranſverſe or ſemilunar inciſion through the teguments and muſcles, I believe to be better adapted than any other, for giving a free paſſage to the ſtone; but as the bladder is compoſed of a very dilatable membranous ſubſtance, there is no neceſſity for a tranſverſe cut being made in it. After laying the bladder bare, therefore, by a ſemicircular cut along the courſe of the ſtone, inſtead of continuing the ſame kind of inciſion with which the operation commenced, a longitudinal cut was made directly on the centre of the ſtone, in order to avoid with as much certainty as poſſible all thoſe parts that ſhould not be injured. Even with this precaution, however, although the urethra was avoided, ſome of

the other parts I have mentioned were always divided; ſo that although they may by accident, perhaps, be avoided once in a great number of times, I am confident that even the moſt expert anatomiſt would ſeldom be able to make an opening into this part of the bladder, ſufficient for extracting a ſtone of a moderate ſize, without dividing either the veſiculæ ſeminales, the vaſa deferentia, or their excretory ducts. In ſome inſtances, too, the entrance of the ureters into the bladder is ſo low down, as to render them liable to be cut in this operation. This, however, is a rare occurrence; but it has in ſome inſtances happened.

Another important objection to this operation is, that the bladder being puſhed forward, and divided at a part that muſt afterwards recede from the wound in the teguments, much riſk muſt be incurred of the formation of ſinuſes, by the urine inſinuating into the neighbouring parts; and we have to add to this, that in general this operation muſt be confined to the early periods

riods of infancy. The readings of Celſus with which we are furniſhed, limit the performance of this operation to the age of ten, or from that to the fourteenth year; but this muſt ſurely be conſidered as an error in the late editions of that work, as this mode of operating is unqueſtionably better adapted for the earlieſt periods of infancy, than for the more advanced ſtages of it, inſomuch that it may always be done with more or leſs eaſe, in proportion to the thickneſs of parts about the rectum and bladder; and this, again, depends in a great meaſure on the age of the patient. We are told, indeed, of ſome practitioners who performed this operation on people of every age, of every habit of body, and whether corpulent or not. Such accounts, however, have never appeared to be authentic.

Among other improvements of this operation of Celſus, the uſe of forceps for extracting the ſtone, was perhaps the greateſt; but neither this, nor any other advantage it can receive, can obviate the dif-

ficulties I have mentioned. We find accordingly, that, about the beginning of the 16th century, ſome time between the year 1500 and 1520, a new method of operating for the ſtone was propoſed at Rome, by Johannes de Romanis, as we are afterwards informed by one of his pupils, Marianus, and whoſe name has been commonly given to it; this being termed the Methodus Mariana, or Lithotomy by the greater Apparatus, from the great number of inſtruments that at firſt were employed in it.

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SECTION V.

Of Lithotomy by the Greater Apparatus.

BY this operation a paſſage is made into the bladder, by cutting into the urethra at the bulb; at which a variety of inſtruments were introduced, for the purpoſe of dilating the paſſage to ſuch a ſize as might eaſily admit of the extraction of the ſtone.

For a conſiderable time after this operation was propoſed, a number of inventions were brought forth, for the ſole purpoſe of rendering the dilatation of the urethra and adjacent parts more eaſy. Theſe it is unneceſſary to enumerate, as an account of the operation, as it was laſt practiſed in its moſt improved ſtate, will ſerve to communicate all that is neceſſary to be known concerning it.

The patient being ſecured, and placed upon a table in the manner to be deſcribed more particularly in Section VII. a grooved ſtaff was then paſſed through the urethra into the bladder; the handle of the inſtrument being carried over the right groin, while its convex part was made to puſh out the urethra on the left ſide of the perinæum. In this poſition the ſtaff was preſerved by an aſſiſtant, who likewiſe ſuſpended the ſcrotum; while the operator, with a ſcalpel in his right hand, made an inciſion from the very bottom of the ſcrotum to within a finger's breadth of the anus, carrying it along the left-ſide of the perinæum, within a very little of the rapha.

The ſkin, cellular ſubſtance, and muſcles, being thus divided, the urethra itſelf was now opened at its bulb, by cutting directly into the groove of the ſtaff; and the inciſion was completed by carrying the knife along to the extremity of the urethra, at the commencement of the proſtate gland.

Various

Various inſtruments were at one period in uſe, termed Dilators, and Male and Female Conductors, for the purpoſe of finiſhing the operation, by dilating ſuch parts as were not cut; and the timidity of ſome operators was ſuch, that they dilated, ſtretched, or lacerated almoſt all that part of the urethra that lies between the bulb and proſtate gland; a degree of caution by no means neceſſary, and which, by the violence which this dilatation did to the parts, was ſure to produce very diſtreſsful conſequences. Other practitioners, however, performing the operation ſo far in the ſame manner, finiſhed the other parts of it in a different way. They firſt introduced a blunt gorget into the bladder, by running its beak along the groove of the ſtaff, and puſhing it forward, ſo as to force a paſſage through the proſtate gland; and this being done, the forefinger of the left-hand was puſhed along the gorget, and with it the paſſage was further dilated, till the opening was ſuppoſed

poſed to be ſufficiently large for the ſtone to paſs through it.

The opening into the bladder being in this manner completed, the ſtone was extracted in the manner I ſhall hereafter point out, when treating of the lateral operation, in Section VII. by the uſe of different forceps adapted to the ſize of the parts; and on extracting the ſtone, all thoſe parts that were not cut in the previous ſteps of the operation, were of neceſſity greatly lacerated.

Although this operation was long practiſed, it is liable to many objections. Of theſe, the number of inſtruments uſed in it is mentioned as one: But, in the improved ſtate of the operation, that I have deſcribed, this objection is entirely removed, no more inſtruments being uſed in it than are daily employed in the moſt ſimple method of performing the lateral operation; namely, a ſcalpel, gorget, and forceps for extracting the ſtone. But the material objections to which it is liable are, that by beginning the inciſion too near

near to the ſcrotum, much more of the urethra is cut than is neceſſary: By not dividing the proſtate gland with the ſcalpel, the parts are ſo much lacerated, firſt by the forcible introduction of the blunt gorget, and then by the extraction of the ſtone, as muſt be the cauſe of much irreparable miſchief: And laſtly, by the parts not being freely divided, we might frequently find it impoſſible to extract large ſtones by this operation, which, in the lateral method now practiſed, might paſs with eaſe. In other reſpects, however, this operation poſſeſſed much merit, and it required only to be improved in a few circumſtances, to become the real lateral operation of modern practitioners. Theſe, however, it is unneceſſary to enlarge upon here, as they will be afterwards particularly pointed out in the deſcription to be given of the lateral operation.

After this operation had been practiſed for thirty or forty years, ſome of the inconveniences that reſult from it ſuggeſted the idea of what was afterwards termed the

the High Operation; an appellation which it derived from the bladder being cut into above the oſſa pubis.

About the year 1561, Franco, a French ſurgeon of this name, publiſhed a treatiſe on herniæ *; and here we find the firſt account of the high operation. It was firſt ſuggeſted to Franco by accident; for having, as he informs us, met with a large ſtone in a child two years of age, which he could not poſſibly extract by the operation then practiſed in the perinæum, he was induced to open the bladder above the pubes: But although the ſtone was extracted, and the child recovered, Franco never performed the operation again; and he even adviſes it not to be done by others, from the great danger which he thinks will attend it.

The next account we find of it is by Roſſet, in a publication on this and other ſubjects, publiſhed at Paris in the year 1590. But it does not appear that he ever performed the operation himſelf; nor was

* Traité très ample des Hernies, par Pierre Franco.

was it any where much practiſed till ſome time after the commencement of the preſent century, when it was adopted and keenly patroniſed in London by Mr Cheſelden and Mr Douglas.

During the twelve or fifteen years immediately ſubſequent to the year 1720, the high operation was frequently performed both in London, Edinburgh, and other parts of Europe; but the lateral operation, with the improvements upon it by Rau, being then more generally known, the ſuperior advantages it was found to poſſeſs very quickly procured it a preference; and ſince this period the high operation has never been generally practiſed, either in this or any other country; but I ſhall now proceed to deſcribe the method of doing it.

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SECTION VI.

Of the High Operation for the Stone.

I HAVE already made it appear, that the fundus of the bladder, or that part of it lying higheſt in the pelvis, is covered with the peritonæum; ſo that at this part no opening, it is evident, can be made in it with ſafety, as the operator would not only incur the riſk of wounding the inteſtines, but the urine would be apt to eſcape into the abdomen. It is the anterior part of the bladder, namely, that part of it that lies between the middle of it and its neck, that ought to be opened in this operation: But this part of the bladder is ſeldom ſufficiently elevated, and as one common effect of the ſtone in the bladder is to induce a diminiſhed or contracted

tracted ſtate of it, this circumſtance of itſelf is a very important objection to this operation; for unleſs the bladder can contain a large quantity, at leaſt a pound and a half in an adult, it ought not to be attempted.

Various methods have been propoſed for diſtending the bladder. Some have ſaid that it may be done by throwing air into it with bellows; and others have adviſed a quantity of water to be injected immediately before the operation, and to retain it by forming a ligature on the penis. Both of theſe methods, however, are apt to do harm by diſtending the bladder too ſuddenly; and we are even told by ſome, that it has been burſt by this kind of treatment. Means, therefore, of a more harmleſs nature ſhould be attempted; and it may be done without running any riſk of hurting the bladder, merely by the patient being accuſtomed, for a conſiderable time before the operation, to retain his urine as long as poſſible; and as ſoon as it is found that he

he can retain a ſufficient quantity, by paſſing a ligature upon the penis ten or twelve hours before the operation, and cauſing him drink plentifully of any diluent drink, we may be almoſt certain of producing an eaſy and ſufficient degree of diſtention.

This being done, the patient muſt be laid upon a firm table, about three feet four inches in height; at the ſame time that his legs and arms ſhould be ſecured, not with ligatures, but with the hands of aſſiſtants. In order to guard as much as poſſible againſt any injury being done to the bowels, the patient ſhould be laid with his head conſiderably lower than his body, and his thighs and buttocks raiſed. By this ſituation, too, the ſtone, which would otherwiſe fall into the neck of the bladder, where it could not be very acceſſible, is brought more contiguous to the intended opening, and is thereby more eaſily laid hold of, either with forceps or the fingers.

The

The patient being thus properly ſecured, an inciſion is to be made with a round-edged ſcalpel, directly upon one ſide of the linea alba, beginning about four inches above the oſſa pubis, and ending at the ſymphyſis of theſe bones: Even the linea alba itſelf may be cut with ſafety; but it is better to avoid it, as the inciſion is more eaſily made in ſoft parts than in tendons or ligaments. The ſkin and cellular ſubſtance being freely divided, the recti and pyramidales muſcles come ſucceſſively into view: In general, the inciſion may be carried on merely by ſeparating theſe muſcles from one another; but no harm could be done by ſome of their fibres being cut.

A ſufficient opening of the external parts being in this manner obtained, the operator ſhould now ſearch with his fingers for the bladder, which he will commonly diſcover immediately above the pubes. With the fingers of his left hand he ſhould now preſs back the peritonæum, with the inteſtines contained in it, and

with the ſame ſcalpel with which he performed the preceding ſteps of the operation, he ſhould penetrate the bladder itſelf in its moſt prominent part. This opening into the bladder ſhould at once be made ſo large as to admit two of the fingers of the operator's left-hand; which being introduced, the inciſion ſhould be enlarged to the length of three inches, by running a probe-pointed biſtoury along one of the fingers, down towards one ſide of the neck of the bladder. The inſtant that the fingers are introduced into the bladder, the ligature upon the penis ſhould be taken off, ſo that the water contained in it may be diſcharged by the urethra, otherwiſe the whole will be diſcharged by the wound, and part of it might lodge among the contiguous muſcles.

The inciſion being in this manner completed, the operator ought to ſearch with his fingers for the ſtone, and if poſſible, it ſhould be extracted without the aſſiſtance of inſtruments: But if this does not ſucceed, forceps muſt, no doubt, be employed.

ed. One great advantage that we derive from this operation is, that as the extraction of the ſtone does not require much force, ſo it is here rarely known to break: But when this misfortune takes place, the pieces will be more eaſily removed with the fingers alone, than with any of the ſcoops commonly employed. The ſtones being removed, the upper part of the wound in the teguments ſhould be drawn together, either with ſtrong adheſive plaſters, or with the twiſted ſuture, care being taken to leave at leaſt an inch and a half in the under part of it open, in order to diſcharge any urine that may be thrown out from the wound in the bladder into the contiguous parts. It might even be proper to keep the whole external inciſion open till the wound in the bladder is reunited; but as the bowels, ſupported now by the peritonæum only, would be apt to protrude at this opening, and as this would prove not only troubleſome but highly dangerous, it ought by all means to be guarded againſt.

With this view, the bowels ſhould be kept open with gentle laxatives, and the patient during the whole courſe of the cure ſhould be kept with his head and upper part of the body low, and the pelvis elevated.

The parts injured in this operation are not any where nearly ſurrounded with bone; ſo that large ſtones can be extracted with more eaſe in this than in any other way: And as the wound in the bladder is made far from its neck, fiſtulous openings are not ſo apt to enſue from it as from inciſions in the perinæum. Theſe are two advantages that we derive from this operation; but the objections to it are various.

1. When the bladder does not admit of ſuch diſtention as to be raiſed above the pubes, it is almoſt impoſſible to make an opening into it without dividing the peritonæum. From this much danger would undoubtedly enſue; air would find acceſs to the whole ſurface of the alimentary canal; the bowels would protrude, and urine would

would eſcape into the cavity of the abdomen.

Many, indeed, aſſert, that no danger enſues from the protruſion of the bowels; that the wound heals with the ſame eaſe, and that the patients recover equally well as if this did not happen. No practitioner, however, in theſe times, will give credit to this, and it is accordingly a very important objection to the high operation.

2. As the urine is apt to find acceſs between the peritonæum and abdominal muſcles, as well as between the bladder and pubes, troubleſome ſinuſes are apt to form in the cellular ſubſtance of theſe parts, and as no vent can be made for the matter, they always terminate in much diſtreſs.

3. It has been obſerved, when the habit of body is not entirely good, that a cure cannot be obtained either of the wound in the bladder, or external teguments. This, it will be ſaid, may be alleged as an objection to every important

operation; but it has been completely eſtabliſhed by obſervation, that degrees of diſeaſe in the conſtitution prove highly detrimental in the high operation for the ſtone, which in the uſual method of operating in the perinæum give much leſs cauſe of alarm.

4. This operation is confined almoſt entirely to patients under thirty years of age: For although it was at one period frequently practiſed on older people, and although no particular reaſon can be given why it ought not to ſucceed in more advanced ages, yet we learn from almoſt every author who has written upon it, particularly from Middleton, Smith, Douglas, and Heiſter, that a very ſmall proportion only recover of ſuch as have paſſed their thirtieth year.

It is perhaps for one or other of theſe reaſons that the high operation has fallen into diſuſe, and that it has not been much practiſed for a great length of time in almoſt any part of Europe. But although this method of operating is attend-

tended with hazard, and is frequently followed with diſtreſsful conſequences, yet there is reaſon to think, that, in particular circumſtances, it might be practiſed with advantage.

The moſt material objection, to the modern or lateral method of performing this operation, ariſes from the bruiſing of the ſoft parts againſt the contiguous bones in the extraction of a large ſtone; which is ſo much the caſe, that we may conſider the riſk in that operation to be almoſt in proportion to the ſize of the ſtone. When a ſtone is ſmall and eaſily extracted, the proportion of deaths in the lateral operation is very ſmall: But whenever the ſtone is of ſuch a ſize as to weigh ſeven, eight or ten ounces, it is perhaps one of the moſt dangerous operations to which a patient can ſubmit. In different inſtances, too, the ſtone has been ſo large, that it could not be taken out by the lateral operation; nay, ſome caſes are on record, in which it became neceſſary to perform the high operation, after the opera-

tor had failed in extracting the ſtone by the uſual method of cutting in the perinæum *.

When, therefore, from the long continuance of the diſeaſe; from the ſenſe of weight about the neck of the bladder; and particularly when from the touch by the finger in ano, we have reaſon to ſuſpect the ſtone to be large, it ought to be an object of conſideration, how far it may be proper to avoid the lateral, and in certain circumſtances, to employ the high operation. The circumſtances to which I allude, reſpect the age of the patient, the ſoundneſs of his conſtitution, and the poſſibility of diſtending the bladder ſo as to raiſe it above the brim of the pelvis. Theſe circumſtances are favourable where the ſtone is large; and when it is known to be ſo, the high operation, although leſs advantageous in the general run of calculous caſes than the lateral method of cutting, may

* We find that it happened to Heiſter. Vid. Heiſter's Surgery, p. 2. Sect. V. Chap. cxlii.

may be practiſed with a greater probability of ſucceſs than any other with which we are acquainted.

Having now ſaid all that is neceſſary reſpecting the Apparatus Altus, we ſhall proceed to the conſideration of what has uſually been termed the Lateral Operation.

SEC-

SECTION VII.

Of the Lateral Operation.

IN the operation of lithotomy, as it was formerly practiſed by the great apparatus, the external inciſion was made in nearly the ſame part that it is now in the lateral operation; but the two methods of operating are materially different in every other circumſtance.

The original invention of the lateral operation is due to a French Eccleſiaſtic, commonly known by the name of Frere Jacques. This operator firſt appeared at Paris in the year 1697, when, by the ſucceſsful event of a few caſes, he was deſired to operate upon a great number. But it ſoon appeared to practitioners of diſcernment, that the fame he had acquired would not probably be of long duration,

ration. For with a very imperfect knowledge of the anatomy of the parts concerned in the operation, a bad aſſortment of inſtruments, and a total neglect of his patients after the operation, it was ſcarcely poſſible that much ſucceſs could reſult from his method. His manner of operating was as follows:

The patient being properly ſecured, either upon a table or on a bed, a common ſolid ſtaff was introduced into the bladder by the urethra, and the handle being carried over the right groin, the convex part of it was made to elevate the teguments and other parts on the left ſide of the perinæum.

With a ſtraight biſtoury he now made an inciſion through the ſkin and cellular ſubſtance, beginning between the anus and tuberoſity of the iſchium, and proceeded upwards along the left ſide of the perinæum, at a ſmall diſtance from the rapha, till it extended at leaſt one half of the courſe of the perinæum. With the ſame knife he now went on along the direction

rection of the ſtaff, to divide the parts between the external inciſion and the bladder, which he alſo opened with the point of the ſame knife with which the other ſteps of the operation had been done. At this opening in the bladder he firſt introduced the index of his left hand, in order to diſcover the ſituation of the ſtone; and having withdrawn the ſtaff, he laid hold of the ſtone with forceps, and performed the extraction in the uſual manner. The patient was now carried to bed, and no farther attention was paid to him by the operator, who never applied any dreſſings, as he truſted the ſubſequent management of every caſe to the nurſe or other attendants.

In conſequence of this unpardonable neglect, and by frequently cutting parts in the courſe of the operation which he ought to have avoided, a great proportion of thoſe on whom he operated died; no leſs, we are informed, than twenty-five of ſixty *. Hence Jacques ſoon fell into diſrepute;

* Vide Morand Opuſcules de Chirurgie, partie ii. p. 54.

diſrepute; and although he afterwards made many improvements in his method of operating, particularly in uſing a grooved ſtaff inſtead of a ſolid one, and in being more attentive to the ſubſequent management of his patients, yet his reputation in Paris never again gained ground; nor do we find that his method was ever attended with much ſucceſs, either in Holland, or in the various parts of Germany, where he afterwards practiſed.

For with ſo much inattention did he proceed, that although he profeſſed to cut directly into the body of the bladder, without injuring either the urethra or proſtate gland; yet in the diſſection of ſuch bodies as died of the operation, it was found, that in many the proſtate gland was divided, together with the veſiculæ ſeminales. In ſome inſtances, the bladder was cut in two or three different parts; in others the rectum was divided; and it even frequently happened, that the bladder was entirely ſeparated from the urethra.

thra *. We need not wonder, therefore, that this practitioner, as well as his method of operating, ſoon fell into diſcredit. But although this was a conſequence that neceſſarily enſued from the ill ſucceſs that attended his practice; yet the world, we muſt admit, is much indebted to Jacques, for having laid the foundation of the lateral method of cutting for the ſtone, which, in its preſent improved ſtate, is practiſed with ſo much ſucceſs over all Europe.

Rau was the firſt who endeavoured to improve this operation of Frere Jacques, which he did by uſing a ſtaff with a deep groove, by which he was enabled to continue the inciſion into the bladder with more certainty than can be done with a ſtaff entirely ſolid. But Rau, afraid of wounding the proſtate gland, introduced a refinement into his method of cutting, which,

* For a particular account of Frere Jacques's method of operating, ſee Dr Liſter's Journey to Paris; the works of Dionis, Meri, Collet, Saviard, and Morand.

which, in the event, proved extremely hurtful, and was probably the cauſe of its being afterwards laid aſide. For, inſtead of dividing the urethra and proſtate gland, by which the extraction of the ſtone would have been made eaſy, he diſſected with much caution by the ſide of the proſtate, till the convex extremity of the ſtaff was diſcovered in the bladder itſelf. At this part an inciſion was made into it, and the ſtone thereafter extracted, in the manner then practiſed for cutting with the great apparatus.

By this method of operating, the rectum and veſiculæ ſeminales were in great danger of being injured; the ſtone was extracted with difficulty; and from the depth of the inciſion, the urine did not paſs eaſily off by the wound, ſo that troubleſome ſinuſes frequently enſued *.

Theſe

* Rau himſelf kept this method of operating as much concealed as poſſible. But an account of it was publiſhed after his death by Albinus; who, by aſſiſting frequently at his operations, became perfectly maſter of the manner of performing it. Vide Index ſuppellectilis anatomicæ, &c. Lug. Batavorum.

Theſe inconveniencies prevented this operation of Rau from ever being generally received, and ſuggeſted to our countryman, the celebrated Cheſelden, the lateral method of cutting as it is now, with a few alterations, very univerſally practiſed.

As this operation of Mr Cheſelden is deſcribed by many writers in Surgery, it is not here neceſſary to enter into a detail of it: I ſhall now, therefore, proceed to deſcribe the lateral operation in its preſent improved ſtate.

That the patient may not find it neceſſary to go ſoon to ſtool after the operation, ſeveral ſtools ſhould be procured by a purgative on the preceding day; and with a view to diſcharge the contents of the rectum more entirely, an injection ſhould be given a few hours before the operation is performed.

When the bladder is in a collapſed ſtate, it is liable in this operation to be cut in different parts by the gorget; the patient ought therefore to be deſired to drink plentifully

tifully of ſome diluent liquor, and to retain his urine for ſeveral hours before being laid upon the table: In ſome, however, the irritation produced by the diſeaſe is in ſuch a degree as entirely to prevent this voluntary retention of urine; in which caſe the penis ſhould be ſlightly compreſſed with a broad fillet for ſome hours before the operation; and we leſſen or remove the irritation by a large doſe of opium.

Theſe circumſtances being adjuſted, and the perinæum and parts about the anus being ſhaved, the patient is now to be laid upon a table for the operation. The moſt convenient height for this table is three feet two inches. It ought to be perfectly firm; and, that there may be ſufficient ſpace for the patient, it ſhould be about three feet eight inches long, and two feet and a half wide.

The patient ſhould be completely and properly ſecured, and the following is perhaps the beſt method of doing it: Let a nooſe be formed in the double of a piece of broad firm tape, five feet in length: the

patient's wriſts being paſſed through this nooſe, he ſhould be deſired to take a firm hold of the outſide of the ankle of the ſame ſide, when, by different turns of the tape round the hand, ankle and foot, his hand is to be firmly ſecured in this poſition; and this being done on one ſide, the hand and foot of the oppoſite ſide are to be firmly tied together in the ſame manner.

The operator ſhould now introduce a grooved ſtaff, of a ſize proportioned to the parts through which it is to paſs. Different ſizes of theſe ſtaffs are repreſented in Plate LXIX: The artiſt who makes them ſhould round off the edges of the grooves, otherwiſe they are apt to injure the urethra; and the extremity of the groove ſhould be perfectly free and open, otherwiſe it is difficult to diſengage the gorget after it has paſſed into the bladder. As the groove is only neceſſary in the convex part of the ſtaff, and from that to its point, the handle of the inſtrument, down to the commencement of the convexity, ſhould be entirely ſolid, ſo as to admit of the penis being

being preſſed upon it without being hurt, either by the hand of the aſſiſtant, or by a piece of tape, which may be ſometimes neceſſary, as I have already adviſed, for preventing the urine from being diſcharged.

I may here remark, that more attention ſhould be given to the length of the ſtaff than is commonly done. Staffs are in general too ſhort; ſo that when, in the courſe of the operation, the handle is preſſed down upon the groin by the aſſiſtant, the point is very apt to ſlip entirely out of the bladder; a circumſtance to be guarded againſt with all poſſible attention, and it cannot with ſuch certainty be done as by making the ſtaff always of a ſufficient length.

The ſtone being again diſtinctly felt, not only by the ſurgeon himſelf, but by his aſſiſtants, the patient muſt now be placed in that poſture in which he is to be kept during the remainder of the operation. The table intended to be uſed ſhould be perfectly level; but, that the patient may

lie upon it with as much eaſe as poſſible, a pillow may be put under his head, and, that the pelvis may be higher than the abdomen, there ſhould be at leaſt two pillows under his buttocks, which ſhould be made to project an inch or two over the end of the table.

A due elevation of the buttocks, is highly important, although ſeldom attended to by the operator; indeed, the very reverſe is often adviſed, the head and upper part of the body being generally kept higher than the pelvis. This, however, can ariſe from inattention only; for we may by the leaſt reflection be convinced, that the more erect the body is kept, the greater will be the preſſure of the inteſtines upon the bladder; and if, by this preſſure, the fundus of the bladder is forced down upon its neck, the riſk of its being wounded muſt be great indeed.

Of ſuch patients as have died of this operation, I have, in different inſtances, found on diſſection, that the bladder was wounded in three different parts: In its cervix,

cervix, as is always the caſe when the gorget is of a proper length; in its ſide conſiderably above the cervix; and, again, in the fundus or upper part of it. Now, this can never happen, if the directions I have given are kept in view; for when the bowels are prevented from falling upon the bladder, by the buttocks being raiſed above the reſt of the body, and if, at the ſame time, the bladder is properly diſtended with urine, it muſt be altogether impoſſible, in the uſual lateral operation, to injure it in an improper part. But if this precaution of having the bladder diſtended during the operation is neglected, at the ſame time that the bowels, by an elevated poſture of the upper part of the body, are allowed to fall into the pelvis, the bladder muſt be ſo completely collapſed, and its fundus puſhed ſo much down upon its neck, as muſt frequently be the cauſe of much unneceſſary hazard.

Beſides the caſes to which I allude, in which the bladder was after death found to

be wounded in different parts, we find a very candid acknowledgment made by a celebrated lithotomiſt, of his being once ſo unfortunate in the lateral operation, that a conſiderable portion of the ſmall guts paſſed immediately out at the wound *.

This would certainly have diſconcerted many operators: But, fortunately for the patient, the operation was in this caſe completely finiſhed; the bowels were reduced and a perfect cure was obtained. Mr Bromfield endeavours to account for this protruſion of the bowels in a different manner; but I am much inclined to believe, that it happened from the pelvis not having been ſufficiently raiſed above the reſt of the body, and from the bladder having been in a collapſed ſtate at the time the inciſion was made in it. For this author, it muſt be remarked, inſtead of ordering the bladder to be diſtended at the time of operating, deſires expreſsly that it may be

* Vide Mr Bromfield's Chirurgical Obſervations and Caſes, Vol. II. p. 264.

be emptied immediately before the operation *.

Matters being adjuſted in the manner I have adviſed, with reſpect to the patient, an aſſiſtant on each ſide is to ſecure his legs and arms: one muſt prevent him from moving the upper part of his body; another muſt lay hold of the ſtaff; and a fifth is required to hand the neceſſary inſtruments to the operator.

The ſurgeon, after having again felt the ſtone with the ſtaff, is now to make the hand of it paſs over the right groin of the patient, ſo that the convex part of it may be diſtinguiſhed on the left ſide of the perinæum: In this poſition it may be exactly preſerved by the aſſiſtant, who with his right hand ſhould lay hold of the handle of the ſtaff, while with his left he elevates and ſupports the ſcrotum.

The thighs of the patient being ſufficiently ſeparated by the aſſiſtants, and the ſurgeon being ſeated between the patient and the window, in ſuch a manner that

* Page 228. Vol. II.

the light may fall directly upon the perinæum, an inciſion is now to be made with a common round-edged ſcalpel through the ſkin and cellular ſubſtance, at leaſt four inches in length in a full-grown perſon, and ſo in proportion in ſmaller-ſized people; beginning a little to the left-ſide of the rapha, nearly an inch below the termination of the ſcrotum, and proceeding along the ſame ſide of the perinæum, till it runs at an equal diſtance between the tuberoſity of the iſchium and the anus, which laſt it ought to paſs at leaſt an inch.

As the ſucceſs of the operation depends in a great meaſure on this part of it being properly performed, it ought at all times to be done with the utmoſt attention. From timidity or inattention, this external inciſion is commonly made too ſhort: Inſtead of four inches, I have often ſeen it, even in the largeſt adult, ſcarcely two. In conſequence of this, the muſcles, and other parts below, are not properly divided; the operator has not freedom to proſecute the other ſteps of the operation;

operation; and if the ſtone is large, the parts through which it has to paſs muſt be much more bruiſed and lacerated than if they had been freely cut with the knife; and as no harm can enſue from the external inciſion being free and ample, it ought in every inſtance to be ſo. Much hazard may enſue from the diviſion of the teguments and muſcles being ſmall; but none from their being largely laid open.

By this firſt ſtroke of the ſcalpel, the ſkin and cellular ſubſtance ſhould be freely divided, ſo as to bring the ſubjacent muſcles completely in view; when, by a continuation of the inciſion, the erector penis, accelerator urinæ, tranſverſalis perinæi and levator ani ſhould be cut *.

As

* Soon after the firſt edition of this work was publiſhed, my friend Dr Monro, in converſing on the lateral operation of Lithotomy, obſerved, that I had deſired muſcles to be cut which might be avoided; and knowing that Sharpe, Camper, and others who wrote upon this operation, ſoon after that important improvement was introduced, of cutting the proſtate gland with the gorget of Hawkins, inſtead of the ſcalpel, were of opinion, that the extenſive diviſion that I have adviſed of

theſe

As no danger enſues therefore from a free diviſion of theſe parts, and as a large opening

theſe parts was unneceſſary, I ſhall here ſhortly mention the reaſons that have made me differ from authorities of ſuch reſpectability.

That this operation may be performed without dividing more muſcles than the tranſverſalis perinæi and levator ani, is well known; but it is not what may be done, but what ought to be done, that in all important operations demands our attention: On the point in queſtion, my opinion has always been, that all thoſe muſcles ſhould be cut that are apt to be bruiſed or torn in extracting the ſtone: Now, this is ſo clearly the caſe with the erector penis and accelerator urinæ, that few will doubt of the propriety of dividing them who have inſpected them in patients dying after the extracting of large ſtones: Whenever a ſtone has been large and difficult to extract, I have always found theſe muſcles much contuſed, often lacerated, and commonly in a ſtate of mortification. Whereas, when completely cut acroſs, this does not ſo readily happen; the divided ends of the muſcles retract; they are thereby ſaved from the violent preſſure of the forceps and ſtone; and the operation is finiſhed with much more eaſe than it otherwiſe poſſibly could be.

Having long obſerved this to be the caſe; knowing that no danger could enſue from dividing them, for it is daily done with impunity to a much greater extent in fiſtulous or ſinuous ulcers of theſe parts, and finding upon trial

opening not only facilitates the extraction of the ſtone, but admits of any bloodveſſel that

trial that the more freely they were cut, the more ſucceſsful the operation commonly proved, I have therefore long been in the practice of doing it: My operations indeed have proved ſucceſsful nearly in proportion to the freedom with which theſe parts have been divided, at the ſame time that the wounds have healed more kindly than when ſmall openings have been made.

Neither has this diviſion of theſe parts any influence on the direction of the external cut, which ought to be in the line that I have mentioned, beginning nearly an inch below the termination of the ſcrotum, a very little to the left of the rapha, and proceeding obliquely along the ſame ſide of the perinæum, till it runs at an equal diſtance between the tuberoſity of the iſchium and the anus.

If the ſkin and cellular ſubſtance have been freely divided, they retract ſo much, that all the muſcles that I have mentioned may be cut with eaſe: This indeed is not often done; by which, ſtones even of no great bulk are extracted with difficulty to the operator, and with perfect torture to the patient; by which lives are often brought into hazard, and even loſt, which otherwiſe might be ſaved.

I have inſiſted the more upon this, as I conceive it to be one of the moſt important points in this very intereſting operation; one on which the ſucceſs attending it muſt at all times in a great meaſure hinge; and particularly from my having witneſſed more diſaſtrous conſequences from

that is cut being eaſily ſecured with a ligature, which can never be done when the inciſion is ſmall, it ought in every inſtance to be large. In general, the arteries with which theſe muſcles are ſupplied are not ſo large as to render ligatures neceſſary; but whenever they prove to be ſo, and eſpecially when the patient is weak and emaciated, the larger arteries ſhould be immediately ſecured before the ſurgeon proceeds to the other ſteps of the operation.

In proceeding to finiſh the operation, ſurgeons not unfrequently open the urethra higher than it ought to be cut, and paſs the knife into the ſubſtance of the bulb itſelf. But this adds greatly to the hazard of the operation: For, the bloodveſſels of the bulb are not only large, but ſinuſes are much more apt to form in it than in other parts of the penis, by which the cure of the wound is rendered much more tedious when

from a timidity in regard to it, that is, from the muſcles not being freely divided, than from all other failures on the part of the ſurgeon.

when this part is divided; and not being neceſſary, it ought always to be avoided. When, therefore, the inciſion of the muſcles is finiſhed, the operator ought to ſearch for the ſtaff with the index of his left-hand; and having found it, he ſhould puſh the point of his finger along the courſe of it till he paſſes the bulb, when, with the edge of his knife turned towards the groove of the ſtaff, he ſhould divide the membranous part of the urethra in its whole courſe, from the bulb to the proſtate gland; and the finger being thus uſed as a director, while by means of it the rectum is completely guarded, this inciſion of the urethra may be made with entire ſafety. There is in general, indeed, ſuch a quantity of cellular ſubſtance between the urethra and rectum, that in this part of the operation the gut cannot poſſibly be hurt, if the ſurgeon is not either very unſteady or inattentive: And by means of the precaution I have adviſed, of keeping the fore-finger of the left-hand always between the knife and the inteſtine, it may in this manner be

be in every inſtance very certainly avoided.

The inciſion of the urethra being finiſhed, the proſtate gland, which we readily diſcover with the finger at the bottom of the wound, is next to be divided. In the hands of an expert ſurgeon, the operation might be finiſhed with the ſame ſafety with the ſcalpel as with any other inſtrument: For, by continuing the inciſion of the urethra, and carrying on the ſcalpel ſo as to divide the proſtate gland laterally, if the finger is ſtill continued between the knife and the rectum, no riſk could enſue from it: But as this part of the operation is performed entirely by feeling, without the aſſiſtance of the eye-ſight; and as many operators are not ſo much accuſtomed to this, as, in ſuch circumſtances, to be ſufficiently ſteady, the rectum might be often injured were the ſcalpel to be commonly employed for completing the operation.

This inconvenience, however, of wounding the rectum, may with certainty be avoided,

avoided, by using a cutting director, or Gorget, as it is termed, instead of a scalpel: This alteration of the gorget was first proposed by Mr Hawkins of London: In Plate LXX. fig. 4. a view is given of this; and in the same Plate, and likewise in Plates LXXI. LXXII. and LXXIII., I have delineated different improvements that have been proposed upon this instrument of Mr Hawkins.

The gorget of Mr Hawkins is contracted too much at the cutting part of it, by which it does not divide the prostate gland sufficiently. Were we to use a gorget much wider in the cutting part of it, the division of the prostate gland might indeed be made extensive enough; but it is not done by the gorget in common use, so that the division of this gland is commonly too small, either for the extraction of a stone, or even for the introduction of the forceps, without much laceration; a circumstance that in every instance should be guarded against.

The

The gorget in ordinary uſe, while it is too narrow in the cutting part of it, is too wide behind; a form which the leaſt reflection muſt ſhew to be not only unneceſſary but hurtful; for, after the diviſion of the proſtate gland, the only uſe of the gorget is to ſerve as a conductor to the forceps; and as this purpoſe is anſwered equally well by a director that does not expand to near the extent of the gorget, it is obviouſly improper to have this inſtrument ſo wide as it is commonly made. But farther, the impropriety of this conſtruction is ſtill more evident, when we compare the ſize of the common gorget with the parts through which it has to paſs: For it is obvious, that it muſt greatly injure the urethra; the back-part of the inſtrument being ſo wide and deep, as to render it impoſſible to paſs it, without much laceration.

The cutting director, Plate LXXI. fig. 2., as we llas the gorget, Plate LXX. fig. 2., will be found to poſſeſs all the advantages of the common gorget, without any

any of its inconveniencies: The cutting part of both expands more than that of the common gorget, ſo that they divide the proſtate gland more freely; and as the blunt part of them is much contracted, they do not lacerate the urethra on being puſhed forward. To thoſe who have never uſed theſe inſtrumentss, and who thereby may have a partiality for the common gorget, theſe inſtruments may perhaps appear not to be ſufficiently wide for conducting the forceps: This, however, is not the caſe; and it will ſoon be found, that they are not only more eaſily introduced than the common gorget, but that they anſwer equally well for conducting either the finger or forceps.

It has been objected to theſe inſtruments, that they will not make ſuch a free diviſion of the muſcles as is done by the common gorget. This, however, proceeds from prejudice in favour of an inſtrument with which practitioners are as yet better acquainted, and which has indeed been deſervedly much employed; but it is

thrown out without due reflection on its import. I have already endeavoured to inculcate the neceſſity of a free diviſion of the teguments and muſcles in this operation; but whoever conſiders this point with attention, will ſee, that this ought to be done with the ſcalpel alone, and that it ſhould not depend in any degree upon the gorget: All that ſhould be left for the gorget or cutting director to do, is to divide the proſtate gland with a ſmall portion of the neck of the bladder. Some practitioners, indeed, have recommended inſtruments for carrying the inciſion into the body of the bladder; but this is a very hazardous attempt, and not in any reſpect neceſſary: For as ſoon as the proſtate gland and neck of the bladder are divided, the forceps are paſſed with eaſe; and the bladder itſelf is ſo eaſily dilated, that it readily yields to the paſſage of the ſtone, however large it may be. What I wiſh to have underſtood, is, that it is not the ſize of the wound in the bladder that renders the extraction of

ſtones

ſtones eaſy or difficult; and that it is on the previous inciſion of the muſcles and proſtate gland that this almoſt entirely depends.

The membranous part of the urethra being divided by the ſcalpel in the manner I have adviſed, the nail of the index of the left hand ſhould be introduced into the groove of the ſtaff, to ſerve as a conductor to the point or beak of the cutting-director or gorget. The ſurgeon having no further occaſion for the ſcalpel, muſt now lay it aſide; and having paſſed the point of the director or gorget along his finger into the groove of the ſtaff, he is now to take the handle of that inſtrument from the aſſiſtant, and having raiſed it from the groin of the patient in which it lay, he muſt with his left hand preſerve it firm in this ſituation, while with his right he puſhes on the cutting director or gorget till it has paſſed freely into the bladder; a point of the operation that he knows is accompliſhed when the urine is perceived to ruſh with free-

dom out at the wound. In executing the firſt part of the operation, the ſurgeon ſhould be firmly ſeated; but in paſſing the gorget or director into the bladder, as likewiſe in extracting the ſtone, he ſhould ſtand immediately before the patient, as in this poſture theſe ſteps of it are more eaſily performed.

It is a point, I may remark, of the firſt importance in this operation, to raiſe the ſtaff to a proper height before puſhing on the gorget. The handle of the ſtaff ſhould form nearly, though not entirely, a right angle with the body of the patient; and if kept ſufficiently firm in this poſition, the gorget or director may be puſhed on with ſafety, as the beak of the inſtrument, if this direction of the ſtaff is continued, can ſcarcely eſcape from the groove in which it runs. But if the elevation of the ſtaff is either much more or leſs than this when the gorget is puſhed forward, the point of the gorget, inſtead of paſſing into the bladder, muſt be forced out of the groove, and paſſing between the rectum

and

and bladder, or between the bladder and pubes, it muſt here do a great deal of harm. I have known even expert ſurgeons, from an unpardonable degree of inattention, fall into this error with regard to the height of the ſtaff. Younger practitioners, therefore, cannot be too much on their guard againſt it.

Even the greateſt attention, however, to the elevation of the ſtaff, will not of itſelf prove ſufficient. The ſurgeon ought previouſly to ſee that the director or gorget is exactly fitted to the groove intended to receive it; for if not properly adapted to each other, the gorget will not run eaſily, and may therefore be very readily puſhed out of the groove of the ſtaff.

With the view of rendering this part of the operation ſafe, different inventions have been propoſed for fixing the beak of the gorget in the groove of the ſtaff, ſo as to prevent it from getting out till it has paſſed into the bladder: But all of theſe gives ſome difficulty in paſſing the inſtru-

ment; and beſides, they do not appear to be neceſſary, as no operator can poſſibly go wrong, but from groſs miſconduct or inattention.

As ſoon as the gorget has freely entered the bladder, the ſtaff ſhould be withdrawn; and this being done, the next ſtep in common practice is, to introduce the forceps immediately; but as the ſtone may be frequently felt with the finger, and as no other method ſerves ſo effectually to diſcover its real ſituation, this precaution of introducing the finger into the bladder ought never to be omitted. Little additional pain is given by the introduction of the finger, and if the operator is lucky enough to diſcover the ſtone, he is thereby inſtructed with much certainty of the beſt direction for the forceps.

The ſituation of the ſtone being in this manner diſcovered, or if, upon trial, it is found that the finger will not reach it, forceps, proportioned to the ſize of the patient, are to be paſſed into the bladder along

along with the gorget or director, while the latter is immediately thereafter to be withdrawn.

In an operation of such importance as this, the most trifling circumstance merits attention; for the more obvious and leading parts of it may be performed in a masterly manner, and yet the whole may fail from want of attention to the less important steps of it. Even the method of withdrawing the cutting-director or gorget, is a matter that requires attention; much more, indeed, than it commonly meets with. After the forceps are introduced, the gorget should be slowly withdrawn in the exact direction by which it was entered; for if turned in any degree either to one side or another, it must necessarily make another incision, not only in the prostate gland, but in all the other parts through which it is made to pass; the impropriety of which is too obvious to require further animadversion.

If the stone has been previously discovered by the finger, it is commonly easi-

ly laid hold of with the forceps; but when the finger has not been able to reach it, it is in ſome inſtances with much difficulty met with. The forceps muſt neceſſarily be introduced ſhut, that is, with their blades as near to each other as their form admits of; for, with a view to prevent them from laying hold of the bladder, they ſhould be ſo conſtructed as not to meet at any part except at their axis, by at leaſt the tenth part of an inch. But as ſoon as they have entered the bladder, they ſhould be gradually opened; and in this expanded ſtate ſhould be eaſily moved about, with their handles ſometimes depreſſed and ſometimes elevated, till the ſtone is diſcovered, when it ſhould as quickly as poſſible be laid hold of. It frequently, however, happens, even with expert ſurgeons, eſpecially when the ſtone is ſmall, that it is not readily diſcovered by the forceps. In ſuch inſtances, we ſometimes meet with it near to the fundus of the bladder; but it is moſt frequently found concealed in the under and back

part

part of it, near to its neck, in that bag that I have mentioned as being formed by the natural preſſure of the urine. When it is diſcovered in this ſituation, nothing will bring it ſo readily into contact with the forceps, as elevating this part of the bladder by introducing the finger into the rectum.

In general, ſtraight forceps, ſuch as are repreſented in Plate LXXV. fig. 1. and 2. are preferred to thoſe that are much crooked, delineated in fig. 3. For they not only act with more power in extracting the ſtone, but ſerve equally well with the others for finding it. Every operator, however, ſhould be provided with all the varieties of forceps now in ordinary uſe.

When the ſtone is difficult to diſcover, the ſurgeon is apt to allege that it proceeds from its being contained in ſome preternatural bag or cyſt; and when laid hold of with the forceps, and an unuſual degree of ſtrength is required to extract it, this is commonly ſaid to ariſe from the

the ſtone adhering to the coats of the bladder. That the weight of a ſtone will ſometimes form a partial cavity for itſelf, by preſſing that part of the bladder on which it lies into the neighbouring ſoft parts, there is no reaſon to doubt; and in ſome inſtances the bladder is found ſo much contracted round a ſtone, as to form almoſt two diſtinct bags. This, however, is rare; and the adheſion of ſtones to the bladder, I believe to be ſtill leſs frequent, if it ever takes place. Stones have indeed been frequently found covered with the coagulable part of the blood, which in ſome inſtances becomes ſo firm and tough, as to have the appearance of an organiſed membrane; but we are perfectly unacquainted with any proceſs of nature by which an adheſion can be produced between the bladder and a ſtone contained in it.

It cannot poſſibly happen by any communication of bloodveſſels betwixt the bladder and ſtone; and it is equally improbable that it can be produced merely by agglutination; for, by the intervention of

of the urine, with which the bladder is conſtantly moiſtened, ſuch an effect muſt be with certainty prevented.

But it is not reaſoning alone that militates againſt this opinion. For although ſuch an occurrence has been frequently mentioned by authors, yet we do not meet with one authenticated inſtance of any firm adheſions betwixt the bladder and ſtones contained in it being diſcovered after death. I am therefore led to conclude, that this idea is entirely void of foundation; and that it has probably ariſen from the miſconduct of operators, who, by making the external inciſion too ſmall, or not dividing the muſcles and proſtate gland ſufficiently, have experienced much difficulty in extracting a ſtone of even a moderate ſize, and who, to eſcape cenſure, have ſuggeſted the poſſibility of ſtones adhering to the internal coat of the bladder.

When the ſtone is laid hold of with the forceps, the operator, before he proceeds to extract it, ought to introduce his finger

ger into the bladder, in order to diſcover whether it is properly fixed in the forceps or not. This in various inſtances proves uſeful, for on finding that a ſtone of conſiderable length is laid hold of in ſuch a manner as to have its longeſt diameter made to preſs in a tranſverſe direction with reſpect to the opening in the bladder, much pain and laceration, which would undoubtedly occur from extracting it in this direction, may be eaſily prevented, either by turning the ſtone with the point of the finger, when this can be done, or by letting it ſlip altogether out of the forceps, and again endeavouring to lay hold of it in a more favourable poſition. When the operator is certain that this is properly done, he is then to extract the ſtone in a very ſlow and gradual manner. The forceps ſhould be very firmly held in both hands, his right being applied towards the extremity of the handles, and his left near to their axis.

In common practice, if the ſtone does not come readily away, the force made uſe

uſe of is applied ſo as to dilate the parts equally in every direction. The ſtone is made to move not only upwards and downwards, but laterally; and, by ſome, even a rotatory motion is given to it. Nothing, however, can be more deſtructive than this to the parts through which the ſtone muſt paſs, while at the ſame time it is evidently ill calculated for facilitating the extraction.

Inſtead of moving the ſtone in this manner, the preſſure ought to be made almoſt entirely downwards; not directly from the ſymphyſis of the pubes towards the anus, but in the courſe of the external wound, which ought, as I have already obſerved, to run at an equal diſtance between the anus and tuberoſity of the iſchium. As it will be admitted, that the force employed in extracting a ſtone muſt prove more uſeful when exerted upon parts that are ſoft and of a yielding nature, than when applied immediately upon a bone; ſo, whoever attentively conſiders the anatomy of the parts concerned in this operation,

operation, will ſee the propriety of the advice I have given. The opening into the pelvis is at this place ſo narrow, that a very ſlight examination muſt render it evident, that in extracting a ſtone, no advantage can be derived from lateral preſſure. If, again, the ſtone is forced upwards, it muſt preſs againſt the bones of the pubes; for this direction nothing intervenes between theſe bones and it, except the urethra, and a ſmall portion of cellular ſubſtance: And if directed towards the anus, it muſt preſs the rectum againſt the point of the coccyx, which will not only give much immediate diſtreſs, but muſt even add greatly to the hazard of the operation.

The rotatory motion which in this operation is ſometimes given to a ſtone, unites all theſe diſadvantages; but by carrying the preſſure downwards in the courſe of the wound, ſo as that it may fall between the anus and iſchium, every inconvenience of this kind is avoided, and a more extenſive

ſive dilatation is obtained than can be procured in any other direction.

By gradual preſſure in this direction, the ſtone, if not uncommonly large, will for the moſt part be extracted at laſt; but when, in the courſe of the extraction, the operator meets with much reſiſtance to the ſtone, he ſhould examine the ſtate of the divided parts, and if any part of the muſcles that ought to have been cut are ſtill found entire, they ſhould be immediately divided; and the eaſieſt method of doing it, is, to ſecure the ſtone in the forceps with the left-hand, while with a ſcalpel in the other, a complete diviſion of the muſcles is accompliſhed.

With a view to prevent the forceps from preſſing ſo much upon the ſtone as might break it, ſome propoſals have been made for rendering the degree of preſſure ſteady and certain. Of theſe the beſt ſeems to be what is repreſented in Plate LXXVI. fig. 3., in which, as ſoon as the ſtone is laid hold of, it is preſerved in the ſame poſition by means of a ſcrew that paſſes from

from one of the handles of the forceps into the other. This, however, I conſider as a very unneceſſary addition to forceps; for when a ſtone is ſmall, no ſurgeon of experience will apply great force to extract it; and when of a large ſize, it will be more for the patient's advantage that it ſhould break than be extracted entire.

I have ſpoken already of the hazard ariſing from the extraction of large ſtones. It is indeed ſo conſiderable, as to warrant this concluſion, that, cæteris paribus, the hazard attending lithotomy may be conſidered as correſponding to the ſize of the ſtone to be extracted. In healthy ſubjects, when the ſtone is ſmall, and the operation properly performed, ſcarcely one in twenty die, but, although a few have recovered from whom ſtones of a large ſize have been taken, yet whenever the ſtone has exceeded ſeven or eight ounces in weight, not above one in ten recover.

This is accordingly a very important circumſtance, and worthy of our moſt ſe-

rious

rious attention; and although the breaking of a ſtone in the courſe of extraction, is in other reſpects diſagreeable, yet, with a view to obviate the dreadful conſequences of tearing out a large ſtone, when in the courſe of an operation it is found to be uncommonly large, and that it cannot be taken out but with much hazard to the patient, might it not be more eligible, either to endeavour to break it with the forceps already introduced, or to withdraw theſe, and to introduce others more fit for the purpoſe? In Plate LXXVII. fig. 1. is delineated forceps of this kind, originally invented by Andreas à Cruce, and ſince improved by Le Cat and others: By means of the long and ſtrong teeth with which they are furniſhed, and eſpecially by the intervention of the ſcrew for compreſſing their handles, almoſt any ſtone may be broken into ſmall pieces; and this being effected, the different pieces fall to be extracted with common forceps.

In ſuch circumſtances, however, or when a ſtone has broken by accident in the

courſe of an operation, the utmoſt care is neceſſary in order to extract every fragment; for, if the ſmalleſt particle is left, if it be not afterwards waſhed off with the urine, it may prove highly detrimental, by ſerving as a nucleus for the formation of another ſtone. After all the larger pieces have been extracted with the forceps, a ſcoop repreſented in Plate LXXVII. fig. 2., proves ſometimes uſeful for taking out the ſmaller particles; but for this laſt purpoſe, nothing anſwers ſo well as injecting large quantities of tepid water into the bladder, either with a ſyringe or bag and pipe. This may be done with entire ſafety, and it commonly anſwers the purpoſe for which it is employed.

When a ſtone is found to have a ſmooth poliſhed ſurface, it is the common opinion that others muſt remain in the bladder, as this ſmoothneſs is ſuppoſed to ariſe from the friction of other ſtones; while a rough unequal ſurface is ſuppoſed to denote the exiſtence of one ſtone only. No dependence, however, ſhould be placed on theſe circumſtances;

circumſtances; for we daily meet with inſtances of a ſingle ſtone with a ſmooth ſurface; and of ſtones that are rough and unequal leaving more than one in the bladder. As ſoon, therefore, as one ſtone is extracted, the operator, inſtead of truſting to external appearances, ſhould firſt ſearch the wound with his finger, as far as it will reach, and then, either with common forceps, or with the thick curved inſtrument repreſented in Plate LXXII. fig. 1. which may be termed a Searcher, and which anſwers the purpoſe better; and as long as any ſtones are diſcovered, the forceps ſhould be repeatedly introduced till the whole are taken out.

In the courſe of this operation, ſome bloodveſſels, as I have already obſerved, are unavoidably divided; but when the inciſion is kept ſufficiently low in the perinæum, and when therefore the bulb of the urethra is avoided, there is ſeldom much riſk to be dreaded from any hemorrhagy that enſues. It ſometimes, however, happens, that thoſe branches of the inter-

nal iliac artery that ſupply the parts lying anterior to the proſtate gland, are ſo conſiderable, as to pour out a good deal of blood: But as a free diſcharge during the operation is the beſt preventive of inflammation, a ſymptom more to be dreaded than any other ariſing from lithotomy, nothing in general ſhould be done, except in very weak habits of body, to put a ſtop to the hemorrhagy till all the ſtones are extracted; when, if it ſtill continues, any artery that appears ſhould be ſecured with a ligature; and if the external inciſion has been made large in the manner I have adviſed, this part of the operation does not prove ſo difficult as is commonly imagined. In different inſtances, I have paſſed a ligature upon an artery almoſt as deep as the proſtate gland; and when a large veſſel has been cut, the advantage derived from this effectual method of ſecuring it, is of itſelf a very important argument for making the external inciſion in every inſtance free and extenſive.

When,

When, however, the divided veſſel cannot be ſecured with a ligature, we are then to endeavour to ſtop the hemorrhagy by preſſure; and for this purpoſe a firm roller introduced at the wound would commonly anſwer; but in order to avoid any ſtop to the flow of urine, inſtead of a ſolid roller, a ſilver canula covered with ſoft linen may be employed. Of this inſtrument I have given a repreſentation in Plate LXXVII. fig. 3.

Notwithſtanding, however, of every precaution, ſome of the deep-ſeated arteries, divided in the operation, continue ſometimes to pour out a great deal of blood, and which, inſtead of paſſing off by the wound, is, in ſome inſtances, collected in great quantities in the cavity of the bladder. As ſoon as this is perceived, means ſhould be employed for removing the blood; and the moſt effectual are, to extract as much of it as poſſible, by a proper uſe of a ſcoop, Plate LXXVII. fig. 2. and afterwards by injecting warm water at the wound, to waſh off the remainder. In this

manner very large collections of blood may be removed; and when, as has sometimes happened, means of this kind have not been employed, the coagulum has at last become so firm, and has filled the cavity of the bladder so much, as to prevent entirely all further deposition of urine. In this case the belly becomes pained and swelled; fever takes place; and death itself very commonly succeeds.

With a view to prevent this unfortunate issue with as much certainty as possible, every patient should, immediately after the operation, be laid in such a posture as may with most certainty tend to discharge any blood that may fall into the bladder. Instead of laying the head low, and the buttocks high, as is commonly done, the pelvis should be lower than the rest of the body; by which the wound is kept in a depending posture, which serves to assist the discharge of any blood that the arteries may pour out. As soon as the flow of blood is stopped, the patient should be untied, and a piece of soft lint being inserted

ſerted between the lips of the wound, the thighs ſhould be laid together, in which poſition he ſhould be carried to bed; and an opiate being given, he ſhould for ſome time be left entirely to the charge of an experienced nurſe. No dreſſing anſwers ſo well as dry lint; for as the urine is conſtantly paſſing off by the wound, and as the parts are thereby kept wet, which makes them apt to fret, a frequent renewal of dreſſings becomes neceſſary; and nothing is either more eaſily applied or removed than a piece of dry lint.

When the ſtone has not been difficult to extract, the patient generally remains free from much pain; and he frequently falls into reſt, and ſleeps during the firſt three or four hours after the operation: But when the ſtone is large, and much violence has been done to the parts in taking it out, ſevere pain in the under part of the belly often ſupervenes in the ſpace of an hour or two from the operation; and it commonly proves, when not ſpeedily removed, to be one of the moſt alarming ſymptoms that

takes place. When merely ſpaſmodic, however, which in ſome inſtances appears to be the caſe, it is commonly ſoon removed by the uſe of warm fomentations to the belly, or by emollient anodyne injections thrown into the rectum.

When by the uſe of theſe remedies, the pain is found to abate, little or no anxiety need be entertained on account of it; but when, inſtead of becoming leſs violent, it proceeds to increaſe, and eſpecially when the belly becomes hard and tumefied, and the pulſe full and quick, much danger is to be dreaded. As theſe ſymptoms almoſt conſtantly proceed from inflammation, blood ſhould be taken in quantities proportioned to their violence; emollient injections ſhould be continued; and if the local application of heat to the abdomen, either by warm flannels, or by warm water contained in a bladder, does not anſwer, the patient ſhould be immediately put into a ſemicupium. In ſuch circumſtances, indeed, I have experienced more advantage from this than from any other remedy; for

for it not only conveys the heat more directly and more fully to the parts affected, but a free diſcharge of urine by the wound is alſo more commonly procured by it than in any other manner, ſo that much relief is often obtained from it.

A due perſeverance in theſe means, with a proper uſe of opiates, a low diet, and a free uſe of diluent drinks, will frequently remove very alarming ſymptoms. But, in ſome inſtances, all our efforts prove fruitleſs: The pain and tenſion of the abdomen continue to increaſe; the wound, inſtead of putting on a florid, healthy appearance, remains ſloughy and pale, which ſeldom fails to precede the moſt alarming ſymptoms; the pulſe becomes quick and feeble, and death cloſes the ſcene. But, when matters terminate happily, the wound by degrees becomes red and of a healthy aſpect: The urine, in ſome inſtances, paſſes by the urethra from the firſt; but in moſt caſes it comes away by the wound for the firſt two or three weeks: The pain in the belly gradually abates; and any ſymptoms of

of fever which prevailed at firſt, are in a ſhort time entirely removed.

The period at which a complete cure of the wound is accompliſhed, is exceedingly various, and depends on the health of the patient: In ſome few caſes of young healthy boys, I have known it completely cicatriſed in leſs than three weeks; but in others, not till the ſixth, ſeventh, or eighth week. In ſome inſtances, again, although a great part of the ſore may heal rapidly, yet a ſmall opening will remain, at which the urine continues to be diſcharged, and, the edges becoming callous, a real fiſtula is produced, that cannot be cured but by another operation; the manner of performing which I ſhall preſently have occaſion to mention. Indeed the prevention of fiſtulous openings depends much on proper attention in dreſſing the wound. If care is taken to introduce the lint ſufficiently within the lips of the wound, till granulations fill it up at bottom, there will ſeldom be any riſk of fiſtulous ſores. The wound ought not, however, to be crammed, either with

with lint or any other dreſſing; for in this caſe the edges muſt either inflame, or acquire a morbid hardneſs. In other reſpects, the treatment ſhould be nearly ſuch as is known to anſwer in ſimilar wounds in other parts. It is proper, however, to obſerve, that nothing removes that excoriation of the buttocks with ſuch certainty, which ſometimes proves troubleſome after this operation, from their being kept conſtantly wet with the urine, as frequent bathing with brandy or lime-water.

Where the conſtitution is enfeebled, incontinence of urine is apt to ſucceed to this operation; for the removal of which nothing proves ſucceſsful till a recovery of ſtrength has taken place. A light invigorating diet, together with the uſe of the cold bath and Peruvian bark, are therefore our principal remedies. But, in order to obviate the immediate diſagreeable effect of a conſtant diſcharge of urine, different inſtruments have been invented. Some of theſe have in view the compreſſion of the penis, in order to prevent the urine from being

being diſcharged; and others, while they are ſo formed as to be concealed within the patient's breeches, are meant to ſerve as receptacles for the urine on its paſſing from the urethra.

In plate LXXVIII. fig. 1. is repreſented the moſt convenient form of the firſt of theſe; and in fig. 2. of the ſame Plate, as well as in Plate LI. fig. 2., are delineated receivers, which by experience have been found to anſwer the purpoſe of the latter both with eaſe and certainty; and they may alſo be uſed in all caſes of incontinence of urine, whether ariſing from this operation or any other cauſe.

While from the ſhortneſs of the urethra in women, they are leſs liable to the ſtone than men, the operation of lithotomy with reſpect to them, is, on the ſame account, much more ſimple, and of courſe more eaſily performed, and accompanied with leſs hazard. It cannot be done by cutting from the perinæum, in the ſame manner as in male ſubjects; for, as the urethra and bladder lie immediately above the vagina,

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any opening made into them from the perinæum, would paſs through the vagina, ſo as to wound it both above and below. There is no neceſſity, however, for hurting the vagina, as the urethra may be divided from one end to the other, without any riſk of touching it.

The patient being placed upon a table, and ſecured in the manner I have already adviſed for male ſubjects, a grooved ſtaff, ſuch as is repreſented in Plate LXXI. fig. 5. is to be introduced into the bladder, by paſſing it along the urethra, which lies between the nymphæ, immediately below the clitoris; and the operator, keeping the ſtaff firm with his left hand, muſt with his right introduce the beak of the cutting director, fig. 1. of the ſame Plate, or of the gorget, fig. 2. Plate LXX., into the groove, and then puſh it eaſily along till it has fairly entered the bladder. The ſtaff is now to be withdrawn, when the operator, as in male ſubjects, ſhould introduce his finger along the director; and having diſ-

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covered a ſtone, ſhould proceed to extract it in the manner I have already adviſed.

By the old method of cutting in females, namely, with the greater apparatus, no inciſion was made into the urethra, but different inſtruments were uſed for dilating it; and this being done, the forceps were employed for extracting the ſtone. In this manner, however, the parts were much lacerated; the patient ſuffered a great deal of unneceſſary pain, and the bladder was commonly deprived of all power of retention. I have therefore no heſitation in giving a preference to the method of operating that I have pointed out, in which the urethra is cut through its whole length, inſtead of being lacerated or torn.

As the bladder in females lies immediately above, and quite contiguous to, the vagina, it has been propoſed, that, inſtead of laying open the urethra, as I have adviſed, an opening ſhould be made directly into the bladder from the vagina, at which the forceps are to be introduced for extracting the ſtone. One caſe of this kind is recorded

recorded by Buſſiere *; and, more lately, other three are related by the late Mr Gooch, in which this method of extraction was ſucceſsfully employed †. It has never, however, been generally adopted; and as various objections occur to it, I do not ſuppoſe that it will ever be frequently practiſed.

By cutting into the bladder through the vagina, parts are injured, which by the other method are avoided: The ſtone, when it does not lie directly upon the vagina, is with difficulty laid hold of; it cannot be ſo eaſily extracted as when drawn along the courſe of the urethra; fiſtulous openings muſt probably occur more frequently after this method of operating than after the other; and if the woman ſhould afterwards become pregnant, the cicatrix formed in the vagina would produce

* Philoſophical Tranſactions for the year 1669, p. 106.

† Vide Caſes and Remarks in Surgery, vol. ii. p. 182. by Benjamin Gooch.

duce pain, obſtruction, and perhaps laceration in the time of delivery.

One great advantage derived from the lateral operation, in its preſent improved ſtate, both in males and females, is, that no laceration takes place if the ſtone be not remarkably large; in which caſe, no precaution can altogether prevent it: But, in a great proportion of caſes, if the parts are freely divided in the manner I have adviſed, all the riſk attending laceration, and which I have endeavoured to point out as the moſt hazardous part of this operation, is avoided with certainty.

I have thus deſcribed the various means which hitherto have been employed by practitioners, for extracting ſtones from the bladder; and from what has been ſaid, it appears, that the lateral operation is, in ordinary caſes, greatly preferable to every other. It ſtands indeed ſo eminently ſuperior to the others for general uſe, that it does not appear neceſſary to draw any farther compariſon between them; but, as I have already obſerved, particular caſes

ſometimes

ſometimes occur, in which the high operation may with propriety be employed inſtead of it: I have already in ſtrong terms pointed out the riſk of extracting a large ſtone by the lateral operation; and I have ſhown, that ſtones of any magnitude that the bladder can contain, may be taken out by the high operation. When, therefore, it is with tolerable certainty known, that a ſtone is uncommonly large, and when the high operation is in other reſpects admiſſible, it ought certainly in every ſuch inſtance to be preferred: For although where ſtones are large it may be better to break them into ſmall pieces in the manner I have adviſed, than to lacerate the parts by taking them out entire; yet the practice is only proper whe the operator unexpectedly meets with a large ſtone after the bladder has been cut into; ſo that wherever it is previouſly known that a ſtone is large, much advantage may be derived from a judicious choice, on the part of the operator, of his method of operating.

In the directions that I have given for performing the lateral operation, the dictates of experience are ſtrictly adhered to, and I have recommended nothing that is not either at preſent very generally adopted, or that I have not myſelf put in practice.

Many propoſals have been made by individuals for the improvement of the operation of lithotomy, particularly of the lateral method of performing it; but a minute detail of all that has been ſuggeſted upon the ſubject, is incompatible with the nature of this work; nor could it ſerve any purpoſe, but to bring into view ſome particular modes of practice, which were either never generally followed, or which, if adopted, have fallen again into diſuſe.

The moſt remarkable of theſe propoſed improvements of the lateral operation, are thoſe of three French ſurgeons, Monſieur Foubert, Monſieur Thomas, and Frère Coſme. The two firſt, invented inſtruments for penetrating the body of the bladder, without wounding the urethra. The

bladder

bladder being diſtended with urine, and an inciſion made through the ſkin and cellular ſubſtance, a cutting inſtrument of a particular conſtruction is then puſhed paſt the urethra into the ſide of the bladder; and an opening being made of a ſufficient ſize, the ſtone is extracted in the uſual manner. One material advantage expected from this is, that by the urethra and proſtate gland being avoided, that inability to retain the urine, and other troubleſome conſequences, which ſometimes enſue from injuries done to theſe parts, are not ſo apt to occur when the body of the bladder alone is wounded. But, independent of other objections to which this method of operating is liable, the wound in the bladder being ſure to recede from the wound in the teguments as ſoon as all the water contained in it is diſcharged, will probably prevent it from being ever adopted; for the urine, not finding a free paſſage by the wound, muſt paſs into the contiguous parts, where it muſt always excite very diſtreſsful conſequences.

So that although this method of cutting directly into the neck or body of the bladder, is, at firſt view, extremely plauſible, yet the leaſt reflection on the conſequences that it would excite, muſt at once bring conviction of the riſk that would reſult from it.

The operation of Frère Coſme is, in effect, the ſame with the lateral operation, as it is now commonly practiſed. The parts that are cut in it are exactly the ſame, only they are divided in a different manner. After the ſtaff is laid bare in the uſual manner, the beak of the inſtrument, fig. 1. Plate LXXVI. is introduced into the groove; and being puſhed forward till it reaches the bladder, the ſpring E is then preſſed down, ſo as to raiſe the knife from its ſheath, when the operation is finiſhed by withdrawing the inſtrument in ſuch a direction as may divide the neck of the bladder and proſtate gland, in the ſame manner as is done by the common gorget: After this, the other ſteps of the operation

tion are to be completed, in the manner directed above with forceps.

Moſt of the other deviations from the eſtabliſhed mode of practice, hitherto propoſed by ſurgeons, conſiſt, either in ſome improvements of the cutting gorget of Mr Hawkins, or in a preference which ſome practitioners ſtill continue to give to the knife. I have already obſerved, that Mr Hawkins gorget does not ſpread ſufficiently at the cutting part of it, and that it is wider and deeper behind than it ought to be, by which it is liable to tear and otherwiſe injure the urethra more than is neceſſary. This inconvenience, however, is removed by the cutting director that I have ventured to recommend, as delineated in Plate LXXI., and in a great degree by the gorget, fig. 1. and 2. Plate LXX.

In regard to the preference given by ſome to the ſcalpel, not only to the director, but to the cutting gorget, I have only to obſerve, that an expert ſurgeon of ſteadineſs, and poſſeſſing a minute know-

ledge of the anatomy of the parts, may with eaſe and ſafety perform the operation with the knife alone; but I muſt alſo remark, that, when the ſcalpel only is employed, the danger of wounding the rectum would in common practice be very great, ſo that the gorget or cutting-director, by either of which the gut is completely defended, ought to be commonly preferred.

In the courſe of this ſection, I have endeavoured to deliver all that is worth recording of modern practice in the operation of lithotomy: I am not conſcious of having omitted any improvements of importance; and I hope it will appear that I have propoſed ſome that are not generally known, or which, if known, are not commonly practiſed.

The operation of lithotomy being one of the moſt important in the department of ſurgery, I have been induced to extend this ſection to a great length: It may therefore prove acceptable, to ſtudents eſpecially, to have ſuch circumſtances enumerated

enumerated in a more conciſe manner, as particularly merit their attention.

1. I have already in ſtrong terms pointed out the propriety of an abſolute certainty being attained, of a ſtone exiſting in the bladder, before the operation of lithotomy is propoſed: And I have endeavoured to ſhow, that no ſymptoms, however ſtrongly marked, afford ſufficient evidence of the preſence of calculus; the operation of ſounding, or touching the ſtone with a ſtaff, being the only certain means we have of judging of its exiſtence.

2. Before proceeding to the operation, a conſiderable quantity of urine ſhould be allowed to collect in the bladder; the rectum ſhould be emptied by an injection, and the buttocks ſhould be raiſed above the reſt of the body: The external inciſion ſhould be more extenſive than is commonly adviſed. In full-grown adults, inſtead of the uſual length of an inch and half, or two inches, it ſhould be at leaſt three inches and a half long; care being taken

to commence the cut at the inferior edge of the pubes, and to continue it in an oblique direction, till it has paſſed the anus, at an equal diſtance between the end of the rectum and the tuberoſity of the iſchium.

3. As the chief reſiſtance to the extraction of the ſtone, proceeds moſt commonly from the muſcles covering the urethra, theſe ought to be freely divided: No danger can enſue from this, and much advantage is derived from it.

4. But, although a free diviſion of the muſcles is of much importance, there is no neceſſity for cutting ſo much of the urethra as is commonly done: It does not facilitate the extraction of the ſtone, and it makes the operation more hazardous than when the membranous part of it only is divided. The inciſion being carried through the teguments and muſcles, ſo as to leave the ſtaff covered by the urethra only, the operator ſhould inſert the index and middle finger of his left hand into the bottom of the wound, by which means the rectum is completely

completely protected; and this being done, an opening ſhould be made in the urethra with the point of the ſcalpel, very near to the proſtate gland, from whence the inciſion ſhould be extended upwards to the bulb, but no farther. This, I may remark, ſhould be done by one ſtroke of the knife, and not by repeated inciſions, as is commonly done; for by this means a rugged unequal wound is produced. In the firſt part of the operation, the edge of the knife ſhould be applied in ſuch a manner as to cut from above downwards, as in this manner the inciſion is accompliſhed both with eaſe and ſafety; but in dividing the urethra, the back of the knife ought to be turned down, while the edge of it penetrates the urethra, and runs along the ſulcus of the ſtaff. In this manner we cannot poſſibly hurt the rectum; which is too frequently done in the uſual method of performing this part of the operation.

5. We have now to divide the proſtate gland, with a ſmall portion of the neck

neck of the bladder. This, I have obſerved, may be done with eaſe and ſafety, with the ſcalpel alone, by a good anatomiſt, accuſtomed to operate, and whoſe hand is perfectly ſteady; but as the proſtate gland muſt be divided in ſuch a direction as to avoid the rectum, with which it is connected behind, and likewiſe the excretory ducts of the veſiculæ ſeminales which terminate here, much accuracy is required to get it accompliſhed, and it can only be done with ſafety to theſe parts by a lateral cut through this gland. A very ſmall variation in the direction of the ſcalpel, might be productive of much danger; and few practitioners being poſſeſſed of ſuch equal ſteadineſs as the certain prevention of this requires, a knife conſtructed in ſuch a manner as to protect the rectum, at the ſame time that it divides the proſtate gland properly, ought certainly to be preferred. The gorget of Mr Hawkins is poſſeſſed of all theſe advantages; but I have likewiſe ſhown, that it is attended with ſome diſadvantages.

diſadvantages. Theſe, however, are obviated by the cutting director that I have deſcribed, as well as by the gorget, Plate LXX. fig. 1. and 2., which make a more clean and ample cut than the common gorget, at the ſame time that they do not tear the urethra, as is done by the gorget, of Mr Hawkins, from its expanding too much behind.

6. After the ſtone is laid hold of with the forceps, it ſhould be extracted ſlowly; not by a rotatory motion, or by preſſure applied equally in all directions; but by endeavouring to ſtretch the parts along the courſe of the wound, in a line directly between the anus and tuberoſity of the iſchium. Moderate lateral preſſure may likewiſe have ſome influence; but no force ſhould ever be applied towards the upper part of the wound; for nothing can be gained by doing ſo, and it muſt always do harm, by preſſing the urethra againſt the pubes. When, in the courſe of extraction, it is found, that the paſſage of the ſtone is impeded by ſome of the muſcles not being freely

freely divided, this ought ſtill to be done, by the operator keeping the ſtone firm in the forceps with one hand, while, with a ſcalpel in the other, he cuts what is neceſſary; or, the forceps may be held by an aſſiſtant, while this additional cut is going on.

7. The ſtone being extracted, ſoft dreſſings ſhould be applied to the wound; and the patient ſhould be laid in bed, with his head and upper part of his body raiſed higher than the pelvis, ſo that any blood poured out from the wound, may be freely diſcharged, inſtead of lodging in the bladder, which otherwiſe it might do.

Having thus enumerated ſuch points in this operation as particularly merit attention, I ſhall now proceed to conſider the operation of Nephrotomy.

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SECTION VIII.

Of Nephrotomy.

WHEN ſtones are impacted in the kidneys, ſo that they cannot paſs off with the urine, they give riſe to a train of very diſtreſsful ſymptoms, which at laſt almoſt conſtantly terminate in the death of the patient.

The ſeverity of the pain is frequently indeed ſo great, as to have induced practitioners to ſuggeſt an operation for extracting the ſtones. This conſiſts in a cut made through the common teguments and muſcles, immediately above the kidney, with an opening into the kidney itſelf, of a ſufficient ſize to afford a free paſſage for a ſtone of an ordinary ſize.

But we are to remember, that, however marked the ſymptoms of ſtone in the kidney

ney may appear to be, that it is impoſſible to judge of it with preciſion. We know that ſtone in the kidney occaſions pain in the region of the kidney, together with ſickneſs and vomiting, and a diſcharge of urine, ſometimes mixed with blood, at other times with mucus, and in ſome inſtances with purulent matter. We alſo know, however, that the ſame ſymptoms are not unfrequently induced by other cauſes, particularly by inflammation and conſequent ſuppuration of the kidney. Many inſtances, indeed, have occurred of the moſt violent nephritic ſymptoms ſubſiſting for a great length of time, where ſtones were ſuſpected as the cauſe; but where the kidney has been found, on diſſection, to be completely ſuppurated, and as it were entirely diſſolved, a quantity of purulent matter being all that it contained; ſeveral caſes of which have fallen within my own obſervation.

Even in calculus of the bladder, a diſeaſe leſs ambiguous than nephritis calculoſa, the ſymptoms are never ſo diſtinct

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and characteriſtic as to render the operation of lithotomy adviſable, if a ſtone be not diſcovered by the ſound. But in diſeaſes of the kidney ſuſpected to proceed from ſtone, we are deprived of this means of diſtinction; ſo that it might not unfrequently happen, that, after laying the kidney open, no ſtone would be found. This is, therefore, a very important objection to the operation in queſtion.

But it is to be farther obſerved, that the kidneys lie at a great depth: Although not entirely covered by the inferior falſe ribs, yet that theſe ribs project ſo much over them, as to ſtand much in the way of an operation; and that, in corpulent people, the kidneys are ſcarcely acceſſible.

Hence, it is impoſſible to make an opening into the kidney with ſo much accuracy and preciſion, as the near contiguity of the neighbouring large bloodveſſels would require; and whoever attempts the operation of nephrotomy, even on the dead body, will find it difficult, or perhaps impoſſible, to cut into the pelvis of the

the kidney, without opening ſome of the large bloodveſſels that belong to it: The great and immediate danger from ſuch an occurrence, is too obvious to require to be farther mentioned.

When, indeed, the inflammation induced by a ſtone in the kidney, terminates in an abſceſs, and when the matter thus collected forms a tumor in which a fluctuation is diſtinguiſhed, little or no danger can enſue from laying it open: And in ſuch an event, the ſtone that produced the tumor will either be diſcharged along with the matter; or it may, if it can be laid hold of, be afterwards taken out with ſafety.

The ſtone being thus taken out, the opening through which it paſſed, if the patient recovers, will either heal by the uſual means employed for abſceſſes in other parts; or the moſt unfavourable termination that can probably happen, will be a fiſtulous ſore, through which a mixture of pus and urine will continue to be diſcharged.

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Upon the whole, we may therefore conclude, that when not directed by the appearance of a tumor to the part that ought to be opened, the uncertainty of the ground upon which we proceed when we undertake this operation,—the difficulty of performing it,—and the very imminent danger that attends it, will more than counterbalance any advantage that can be derived from it; ſo that the operation of nephrotomy will never probably be received into general practice, however much it may be recommended by ſome, who, in order to raiſe a reputation which they might not otherwiſe obtain, will ſometimes ſtep forward and propoſe with confidence what no practitioner of character would think right to attempt *.

* For further information on the ſubject of Nephrotomy, ſee Roſſetus de Partu Cæſareo, cap. vii. ſect. 4. Philoſophical Tranſactions for the year 1696. Schenkius Obſervat. Med. lib. iii. Juncker's Conſpect. Chirurg. tab. 93. Edinburgh Medical Eſſays. Mémoires de l'Academie Royale de Chirurgie de Paris.—And Mery's Obſervations ſur la Manière de Tailler.

SECTION IX.

Of Stones in the Urethra.

PATIENTS liable to calculous complaints frequently paſs ſmall ſtones with their urine. When theſe ſtones are ſmooth and not very large, they uſually come off with little difficulty; and in ſome caſes ſtones even of a conſiderable ſize are paſſed without exciting much pain. But when an angular or rough ſtone is puſhed into the urethra, if not ſo ſmall as to paſs off with the firſt flow of urine, it never fails to create a great deal of diſtreſs.

Pain is the firſt ſymptom produced by a ſtone lodged in the urethra; and to this ſucceeds inflammation, tumefaction of the parts, and always a partial and frequently a total ſuppreſſion of urine. In ſome inſtances,

ſtances, when a ſtone in this ſituation is long neglected, this ſuppreſſion and conſequent tumefaction terminate in a rupture of the urethra; in conſequence of which, the urine eſcapes into the contiguous cellular ſubſtance, and very troubleſome ſwellings ariſe not only in the body of the penis, but frequently in the ſcrotum, and through the whole courſe of the perinæum.

The treatment ſuited to ſuch tumors will be pointed out when we come to treat of fiſtulous ſores in theſe parts; ſo that I ſhall now only relate the eaſieſt and moſt effectual means of extracting ſtones from the urethra.

When a ſtone has been long fixed at one particular part without yielding in any degree, and when the pain and inflammation that it excites are conſiderable, it ought to be cut out in the manner I ſhall hereafter adviſe; but on firſt paſſing down from the bladder to the urethra, we frequently ſucceed by more gentle means.

Whether or not the urethra itſelf is poſſeſſed of any contractile power, is a point not to be eaſily aſcertained; but the muſcles with which it is immediately connected, are, in common with other muſcular parts, ſubject to the influence of ſtimuli; and as nothing with which we are acquainted, can be ſuppoſed to give a more powerful ſtimulous to a ſenſible part than the irritation of a rough or angular ſtone, ſo we may fairly conclude, that when once a ſtone is impacted in the urethra, its further paſſage along that canal will be impeded by a ſpaſmodic contraction of the contiguous muſcles. One very important indication, therefore, in the treatment of this malady, is, the removal of ſpaſm; and when we keep this idea in view, and continue to perſiſt in the uſe of proper remedies, we ſeldom fail to bring off ſuch ſtones as have been lodged in the urethra, without the aid of any chirurgical operation. But, inſtead of the application of means calculated for the removal of ſpaſm, the ordinary practice of ſurgeons

geons is the direct reverſe, and is therefore apt to produce a very oppoſite effect.

An attempt is commonly made to puſh the ſtone forward at once with the fingers. It is obvious, however, that until the ſpaſm by which the obſtruction is partly produced is removed, every trial of this kind will rather tend to increaſe the complaint. For this reaſon, therefore, no preſſure ſhould be employed till the moſt effectual means have been uſed for removing the ſpaſm produced by the ſtone. With this view, the patient, if he is plethoric, ought to loſe a conſiderable quantity of blood by the lancet; or, if he is thin and emaciated, a proportional quantity ſhould be diſcharged by leeches, directly from the pained part. A quantity of warm oil ſhould be repeatedly injected into the urethra, in order to lubricate the paſſage.—The patient ſhould be immerſed in a warm bath,—and a full doſe of laudanum ſhould be given about an hour before going into the bath.

Together with theſe remedies, a plentiful uſe of diuretics, and diluent drinks, is commonly preſcribed; but, inſtead of proving uſeful, they almoſt conſtantly do harm. For, when the urine ruſhes out with violence, if it does not carry the ſtone freely out of the urethra, it tends to fix it more firmly than before; and the pain thus produced, will always increaſe the inflammation, tention and ſpaſm of the parts affected: So that whatever has much effect in increaſing the quantity of urine, ſhould be carefully avoided.

A proper quantity of blood having been diſcharged; the patient having remained for a ſufficient length of time in the warm bath; and the opiate having begun to operate; the parts will thus be as completely relaxed as poſſible; and this is the period when ſome attempt ſhould be made for extracting the ſtone.—Various inſtruments have been contrived for this purpoſe, particularly long ſmall pliers or forceps, concealed in a canula of a ſize correſponding to that of the urethra; but as none

none of theſe have ever proved uſeful, and as they often do much harm, by tending to increaſe the irritation in the urethra, I do not think it neceſſary to delineate any of them.

Inſtead of uſing theſe inſtruments, the ſurgeon ſhould at firſt endeavour by gentle preſſure to puſh the ſtone forward along the urethra, and by continuing to move it eaſily in different directions, and perſevering for a conſiderable time, we often ſucceed in bringing it off, when otherwiſe it muſt have been cut out.

It frequently happens, however, that ſtones of ſuch a ſize and figure get into the urethra, as cannot by any means be made to paſs off. When a ſtone, thus fixed in the paſſage, is of ſuch a form as to admit of the urine being diſcharged, a patient, rather than ſubmit to an operation, will ſometimes allow it to remain; by which the ſtone, in a ſhort time, commonly obtains an increaſe of ſize by a depoſition of earthy matter from the urine: Of this I have met with various inſtances,

in which the ſtones became very large, and in which the urethra was ſo much dilated as to form an extenſive pouch or cavity correſponding to the ſize and figure of the ſtone. But when the ſtone, inſtead of allowing any of the urine to paſs, fills up the urethra entirely, it becomes neceſſary to remove it by an operation, as ſoon as the means that I have adviſed have been found to prove of no avail.

This operation conſiſts in cutting directly upon the ſtone, and extracting it either with a ſcoop, or with ſmall forceps; but the methods of effecting this ought to vary according to the part of the urethra in which the ſtone is fixed. When a ſtone is ſituated near to the beginning of the urethra, and contiguous to the bladder, it has been adviſed to puſh it again into the bladder by means of a ſtaff: But as it might there probably acquire a larger ſize, and would conſequently render the patient liable to all the diſtreſs and hazard ariſing from a ſtone in the

the bladder, this is a practice by no means to be admitted, as the ſtone may be extracted with much more eaſe from any part of the urethra, and with much leſs hazard to the patient, than is always incurred by the more formidable operation of cutting into the bladder.

When, therefore, an operation is neceſſary for extracting a ſtone fixed in the urethra near the neck of the bladder, the method of performing it is this:

The patient ſhould be laid upon a table, and ſecured in the manner I have directed for lithotomy: And an aſſiſtant ſuſpending the ſcrotum and penis, the ſurgeon, after oiling the firſt and ſecond fingers of his left-hand, ſhould introduce them into the anus, and by means of them ought to preſs firmly upon the parts immediately behind the ſtone; which will not only enable him to lay it bare with more eaſe, but will be the ſureſt method of preventing it from being puſhed into the bladder by the neceſſary preſſure of the knife. This being done, an inciſion ſhould be made

made through the common teguments and urethra, ſo as to lay the ſtone completely bare; which may now be either turned out by a due degree of preſſure applied with the fingers in the rectum; or, if this be not ſufficient, it may be taken out either with a ſcoop, or with ſmall forceps.

The after-treatment is the ſame here as I have adviſed in the operation of lithotomy.

When, again, a ſtone has paſſed farther on in the urethra, in order to extract it the ſkin ſhould be drawn as much as poſſible paſt it, either in a backward or forward direction; and the ſtone being now ſecured in its ſituation by preſſure, a longitudinal cut is to be made upon it, directly through the ſkin, cellular ſubſtance, and urethra, of a ſufficient ſize to admit of its being extracted, either with the ſcoop or forceps. The edges of the wound are now to be completely cleared of ſabulous particles, and the ſkin allowed to regain its natural ſituation; by which means, if the operation has been properly

ly done, the wound in the urethra will be entirely covered with ſkin that has not been injured: a circumſtance that tends to render the operation much leſs formidable than it otherwiſe would be; for the wound in the urethra is thus ſo well protected, that it commonly heals by the firſt intention.

It ſometimes indeed happens, when the operation is done in this manner, that in voiding urine, part of it eſcapes at the wound, and inſinuates into the contiguous cellular ſubſtance. This, however, is a rare occurrence, and the inconveniencies that ariſe from it are eaſily obviated, by laying open any collection of urine that takes place during the cure.

When a ſtone fixes near to the point of the yard, in that part of the urethra running through the glans; if it is ſo near as to be ſeen, it may frequently be taken out with ſmall diſſecting forceps: And in order to facilitate the extraction, when it cannot be otherwiſe done, the end of the urethra may be dilated with the point

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of a biſtoury: But when this fails of ſucceſs, an inciſion muſt be made upon the ſtone in the manner I have adviſed where the urethra is covered with ſkin. Soft dreſſings ſhould be applied to the wound; and when the cure is nearly completed, a hollow bougie, a ſhort ſilver tube, or a catheter of elaſtic gum, ſhould be paſſed into the urethra, in order to preſerve it of a proper ſize.

The moſt perplexing ſituation in which a ſtone can be fixed in the urethra, is juſt behind the ſcrotum; for if the ſtone is either forced into the ſcrotum, or if it becomes neceſſary to make an opening into it with a ſcalpel, the urine is apt to collect in it, from which a great deal of diſtreſs never fails to enſue.

In order, therefore, to obviate this inconvenience, as ſoon as a ſtone is diſcovered in this ſituation, we ſhould endeavour, with all poſſible attention, either to get it carried farther along the urethra, or, if this cannot be done, to puſh it back into the perinæum with a ſtaff: But when this

this is found to be impracticable, and that the ſtone muſt be extracted, an inciſion ſhould be made in the urethra, by beginning the cut at the under part of the ſcrotum, immediately to one ſide of the ſeptum, and proceeding upwards till the ſtone is diſtinctly felt, when it muſt be laid bare and taken out in the manner I have already adviſed.

By making the inciſion from below upwards, any urine that eſcapes from the urethra finds a free paſſage; and if the opening is ſufficiently large, the ſtone may in this manner be extracted eaſily: During the operation, the teſtes ſhould be as much protected as poſſible: And on the ſtone being removed, the dreſſings ſhould be applied in ſuch a manner, that the ſore may heal from the bottom; for this being neglected, and the teguments allowed to heal before every vacancy is filled up, purulent matter, and perhaps urine, will very probably collect, and may thus give riſe to troubleſome ſinuſes.

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When urine continues to be diſcharged for any length of time at a preternatural opening of the urethra, whether the conſequence of the operation of lithotomy or of any other cauſe, if the calculous diatheſis prevails, ſtones of a large ſize will frequently form in the cellular ſubſtance contiguous to the opening. I have met with ſeveral inſtances of this: In ſome the ſtones were ſmall, and eaſily taken out; but in others, where they ſpread and occupied a conſiderable portion of the cellular membrane, they were very difficult to remove *. The treatment here conſiſts ſolely in making a free inciſion along the courſe of the calculous concretions; in turning them out, either with a ſcoop or ſmall forceps; and in dreſſing the wound properly, ſo as to induce a firm adheſion of the parts beneath, before the teguments are permitted to heal.

In females, the urethra is ſo ſhort, and dilates ſo readily, that ſmall ſtones ſeldom ſtop

* A very remarkable caſe of this nature is recorded by Gooch. See Caſes and Practical Remarks in Surgery vol. ii. p. 174. by Benjamin Gooch.

ſtop in it: They are moſt commonly carried off by the flow of urine that brings them into it; but when they happen to fix in it, they are eaſily turned out, merely by inſinuating the end of a blunt probe behind them, and then pulling them forward: Or, when this does not ſucceed, it may always be done with ſafety, by laying open the extremity of the urethra with a ſcalpel, ſo far as to admit of the introduction of ſmall forceps.

CHAP-

CHAPTER XXX.

Of Incontinence of URINE.

INCONTINENCE of urine may ariſe from various cauſes; but being frequently connected with calculous complaints, and in ſome inſtances the conſequence of the operation of lithotomy, I am hence induced to ſpeak of it here.

1. It may ariſe from irritation about the neck of the bladder, produced by the friction of ſtones contained in it. Thus we know, that inability to retain urine is a frequent ſymptom of ſtone in the bladder; and we cannot ſuppoſe it to proceed from any other cauſe than the conſtant ſtimulus communicated

communicated by the ſtone to the coats of the bladder. For, were it always produced, as has been ſuppoſed, by a total loſs of power in the ſphincter veſicæ, the diſeaſe would ſeldom or never admit of a cure. But we know well, that incontinence of urine, depending upon ſtone in the bladder, is often removed entirely by the operation of lithotomy: And we likewiſe know, that it is often much relieved, even when the ſtone remains in the bladder, by the uſe of thoſe remedies that moſt effectually remove irritability; particularly by a plentiful uſe of mucilaginous drinks, and a free uſe of opiates. By a continued uſe of theſe remedies, indeed, this variety of the diſeaſe is commonly removed with more certainty than by any other means, extraction of the ſtone excepted; which, when theſe fail, is to be kept in view as the only reſource upon which we are to depend.

2. Incontinence of urine is a frequent effect of palſy; and it would appear, that the ſphincter of the bladder ſometimes loſes its contractile power, while the natu-

ral tone of the muſcle termed Detruſor Urinæ, which conſtitutes the chief part of the body of the bladder, remains entire. In this variety of the diſeaſe, the obſtinacy of the paralytic affection with which the conſtitution is attacked, commonly renders fruitleſs every attempt to remove it. But the moſt obvious remedies to be employed for it, are, tonics, particularly Peruvian bark, chalybeates, and eſpecially the cold bath general and local. The local application of cold to the perinæum has frequently a powerful influence: Cloths wet with vinegar and cold water, or with a ſtrong ſolution of ſaccharum ſaturni in vinegar, prove ſometimes uſeful; but the moſt effectual method of applying cold, is by daſhing water upon the loins, perinæum and fundament.

3. Incontinence of urine is not an unfrequent effect of laceration in the operation of lithotomy in male ſubjects; and in the ſame operation, and by violence done to the parts in delivery, in females. It ought, however, to be remembered, when in

in the lateral operation much laceration is produced, that in general it proceeds from the muſcles not having been divided with ſufficient freedom by the knife; and accordingly, except in caſes of large ſtones, incontinence of urine ſeldom ſucceeds to this operation when properly performed.

As the diſeaſe in this caſe depends upon nearly the ſame cauſe as that which I mentioned laſt, namely, on a loſs of power in the retaining parts, the ſame remedies are proper; and by due perſeverance, particularly in the uſe of cold bathing, many are at laſt very completely cured of this variety of the diſeaſe. But it frequently happens, in all the varieties of the diſeaſe, that no relief is obtained from any remedy whatever; in which caſe, it becomes an object of importance to prevent the urine from incommoding the patient, which never fails to happen, if means are not employed to prevent it.

When it proceeds from either of the laſt-mentioned cauſes, namely, from a paralyſis of the ſphincter of the bladder, or from

laceration, compreſſion of the urethra anſwers the purpoſe; as the preſſure can be ſo modified as to be applied and removed at pleaſure. Nuck invented the firſt inſtrument for this purpoſe of which any deſcription is given. The Jugum, or Yoke, as it is termed, Plate LXXVIII. fig. 1. is an improvement upon this; and, when properly fitted, it anſwers the purpoſe exceedingly well. When lined with quilted ſilk or velvet, it ſits eaſily on the penis, and by means of the ſcrew, the preſſure can be made ſufficiently tight. For women another invention is neceſſary, as the preſſure muſt be applied through the vagina. Peſſaries of reſina elaſtica, and of ſponge, have been propoſed for it, but thoſe of ivory or lignum vitæ anſwer better: In Plate LXXIV. are repreſented peſſaries of different kinds.

Peſſaries ſhould all be finely poliſhed, and dipped in oil immediately before being introduced. After being paſſed into the vagina, the peſſary ſhould be placed directly

rectly acroſs, ſo as to preſs with as much effect as poſſible againſt the urethra.

This method of obviating the inconveniences ariſing from incontinence of urine, by preſſure, is not, however, applicable when the diſeaſe proceeds from irritation about the neck of the bladder; for the continual deſire to paſs water, with which patients in ſuch circumſtances are tormented, renders every attempt to ſuppreſs a complete diſcharge of it totally inadmiſſible. It is therefore a point of the firſt importance to diſtinguiſh between the different cauſes of this ſymptom; for it is obvious that a remedy that may be well calculated for one variety of the diſeaſe, may prove highly prejudicial in others.

Whenever it is found that preſſure upon the urethra is improper, or that it does not anſwer, relief may commonly be obtained from a machine properly fitted to ſerve as a reſervoir for the urine. The inſtruments formerly referred to, repreſented in Plates LI. and LXXVIII. have been often uſed, and commonly with much advan-

tage. They ſhould be made ſo as to apply as cloſely as poſſible to the parts on which they reſt; and when properly fixed to a circular bandage round the body, they remain ſufficiently firm, and at the ſame time admit of every neceſſary change of poſture in ordinary exertions of the body. The laſt of theſe inſtruments, namely, the one delineated in Plate LXXVIII. fig. 2. proves uſeful only in men; but the other, Plate LI. fig. 2. may be employed for women alſo.

CHAP-

CHAPTER XXXI.

Of Suppreſſion of URINE.

THE ſubject of the preceding chapter, namely, Incontinence of Urine, proves always troubleſome and inconvenient; but the diſeaſe that we are now to conſider, proves, in every inſtance, very alarming, and often ends in the death of the patient. *.

* It is that variety of the diſeaſe to which I allude, in which the urine is collected in the bladder, but which the patient is unable to diſcharge. When ſuppreſſion takes place from a morbid ſtate of the kidneys, a variety of the diſeaſe is produced, that no chirurgical operation can relieve; ſo that it does not fall to be conſidered here.

A ſuppreſſion of urine may be the effect of various cauſes, and in the method of cure a nice diſcrimination of theſe is neceſſary.

1. In the preceding chapter we have ſeen, that incontinence of urine is often produced by the ſphincter of the bladder becoming paralytic, while the detruſor urinæ ſtill retains its power of contraction. In like manner, a ſuppreſſion of urine frequently occurs in palſy, and ſeems to proceed from loſs of power in the body of the bladder, while the ſphincter ſtill preſerves its uſual power of retention.

Although this variety of the diſeaſe is often connected with palſy of all the under part of the body, yet it is frequently induced by the pernicious cuſtom of remaining too long, eſpecially when drinking freely of diuretic liquors, without voiding urine; by which the bladder is ſometimes ſo far over diſtended, that it loſes entirely all power of contraction.

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The catheter proves here commonly a very certain remedy when employed early, and it ſhould always be adviſed as ſoon as it is found that the urine collected in the bladder cannot be paſſed. For although the uſe of this inſtrument ſhould never be adviſed where it can with ſafety be avoided, yet as in the circumſtances we are now conſidering, delay never fails to prove dangerous, the urine ſhould always be drawn off as ſoon as the ſtoppage excites irritation. At the commencement of the diſeaſe, it is for the moſt part eaſily done; while long delay, by exciting ſwelling and inflammation about the neck of the bladder, never fails to render it both more difficult and more painful, and in ſome inſtances even impoſſible to paſs the catheter. The method of paſſing the catheter, both in male and female ſubjects, is the ſame with the operation of ſounding for the ſtone, already deſcribed in Chapter XXIX. Section II.

2. A ſuppreſſion of urine is frequently produced in the laſt months of pregnancy, by

by the preſſure of the uterus on the neck of the bladder. So completely indeed is the urine ſometimes obſtructed by this, that not a ſingle drop can be diſcharged but with the aid of a catheter; and as this inſtrument is in females commonly introduced with eaſe, it ſhould always be done as ſoon as the urine cannot be otherwiſe voided. Delay in uſing the catheter is often the cauſe of much diſtreſs. In different inſtances, the bladder has from this cauſe alone been diſtended to ſuch a degree as to loſe the power of contraction; and in a few caſes, it has even burſt entirely: We ſhould not therefore heſitate to adviſe the catheter to be employed, on finding that the bladder is in any degree diſtended beyond its uſual ſize.

3. Tumors in the vagina and neighbouring parts, when they become large, are apt to compreſs the urethra ſo much as to induce a total ſuppreſſion of urine; and a prolapſus uteri is often attended with the ſame effect.

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The method of treatment beſt calculated for removing a prolapſus uteri, as likewiſe the means of cure commonly employed in tumors in the vagina, will be the ſubjects of different chapters; only it muſt be remembered, that till theſe views are accompliſhed, the urine ſhould be regularly drawn off with the catheter, whenever it is collected in large quantities.

The very irritable ſtate of the parts about the neck of the bladder, that often prevails in ſuppreſſion of urine, renders it neceſſary in ſome inſtances to uſe the catheter often. Inſtead of this, ſome practitioners have adviſed the common catheter to be allowed to remain in the bladder a conſiderable time at once, ſo as to admit of the urine being diſcharged as ſoon as it is ſecreted: But this is a practice that ought not to be admitted; for the irritation ariſing from a long continuance of a catheter in the bladder, commonly does more harm than we ever experience from a frequent uſe of it. When it is wiſhed, however, to allow a catheter to remain

remain in the bladder, either for this purpoſe, or for wounds in the urethra, the hard ſilver tubes in common uſe ought not to be employed: thoſe that are prepared with reſina elaſtica, anſwer the intention better, and I have found by experience, that they do not diſſolve in the urine: In one caſe a tube of this reſin was kept in the bladder twenty-two days without being hurt by the urine.

4. A ſtoppage to the flow of urine is not an unfrequent effect of an enlarged ſtate of the proſtate gland, and of obſtructions in the urethra in virulent gonorrhœa. The treatment beſt ſuited to theſe affections will form the ſubject of part of the enſuing chapter.

Suppreſſion of urine induced by ſtones impacted in the urethra, has been already conſidered in Section IX. of Chap. XXIX. where the remedy was pointed out.

5. But the moſt alarming variety of the diſeaſe, is that which proceeds from inflammation about the neck of the bladder, inducing pain and ſwelling to ſuch a degree,

degree, as often make it impoſſible to paſs the catheter.

Suppreſſion of urine from this cauſe is not an unfrequent conſequence of inflammation in gonorrhœa proceeding backwards along the urethra: It is ſometimes, although not often, induced, by an unguarded uſe of ſtimulating injections; and as the bladder is equally liable with other parts of the body, to the influence of every cauſe that excites inflammation, whatever excites inflammation in other parts will very readily do ſo here.

In whatever way inflammation may be induced, the means of cure ſhould be nearly the ſame: Blood ſhould be diſcharged from the arm in quantities proportioned to the ſtrength of the patient, and a conſiderable number of leeches ſhould be applied to the perinæum as near as poſſible to the ſeat of the diſeaſe, and allowed to bleed freely. Opiates ſhould be given in large doſes; injections of warm water or milk, whether by themſelves or combinded with opiates, ſhould be repeatedly thrown

thrown into the rectum; and the whole body ſhould be immerſed in the warm bath. By theſe means, when the inflammation is not violent, the ſuppreſſion will in ſome inſtances be removed before any diſtreſsful ſymptoms take place. But when theſe remedies do not prove effectual; when the bladder becomes painfully diſtended; and when every attempt to introduce the catheter has failed, other means of relief ſhould be employed. In ſuch circumſtances, puncturing the bladder is the only remedy on which we can with certainty depend: Being an operation of ſome nicety and hazard, ariſing not ſo much from the difficulty of doing it, as from the conſequences that ſometimes reſult from it, and the ſtrict confinement that for a conſiderable time it entails upon the patient, it ought never to be adviſed till the other remedies I have mentioned have been tried in vain; at the ſame time, however, I think it right again to obſerve, that it ſhould never be long delayed after

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our other means of relief have been found to fail.

The bladder may be punctured in various ways: It may be done a little above the pubes: The membranous part of the urethra, and proſtate gland may be cut, and an opening made in the neck of the bladder. An opening may be made from the perinæum, directly into the body of the bladder; and a puncture may be made in the back part of the bladder by paſſing a trocar into it from the rectum. As the method of puncturing the bladder, after dividing the membranous part of the urethra and proſtate gland, is obviouſly more hazardous than any of the others, it is now very deſervedly laid aſide, ſo that it is not neceſſary to ſpeak of it farther. We have, therefore, only to conſider the other three modes of operating.

In puncturing the bladder above the pubes, we are directed by authors, firſt to make an inciſion, two inches in length, through the common teguments and muſcles, and then to perforate the bladder with

with a trocar. But there is no neceſſity for this extenſive diviſion of the teguments and muſcles; for the operation may be done with equal ſafety and with leſs pain to the patient, by puſhing a trocar at once through the ſkin, muſcles, and bladder; and it may be entered any where from the height of half an inch to an inch and half above the pubes, and at half an inch or thereby on either ſide of the linea alba. Some adviſe the trocar to be paſſed obliquely downwards, with a view to prevent the back part of the bladder from being hurt; but we act with more ſafety, and guard with more certainty againſt this injury to the bladder, by making uſe of a ſhort canula, and paſſing the trocar nearly in a horizontal direction; for, in paſſing it obliquely down towards the centre of the pelvis, the bladder, on being left empty, would, in a great proportion of caſes, be apt to ſlip off from the end of it, by which the urine would be extravaſated, and lodge in the contiguous parts. As ſoon as the trocar has pierced the bladder, the ſtilette

ſhould

ſhould be withdrawn, and the canula ſecured in its ſituation with pieces of ribbon or tape connected with it, tied to a circular bandage, paſſed round the body.

The length of the canula uſed in this operation is, I may remark, a point of the firſt importance, and merits particular attention; for much inconvenience would ariſe from its being too ſhort, while a long canula, as I have already obſerved, is apt to injure the back part of the bladder. Of this we have an inſtance on record, in which the end of the canula was found, after death, to have penetrated not only the back part of the bladder, but even the rectum *.

In corpulent people, the canula may require to be two, three, or even more inches in length, according to the quantity of fat between the ſkin and bladder; but in thin patients, I know from experience, that an inch and half is ſufficient.

* Vid. Sharpe's Operations of Surgery, Chap. XV.

The canula, it muſt be remembered, ſhould be retained in its ſituation till the cauſe of the obſtruction is ſo far removed, that the urine can be paſſed in the uſual manner; but it has been very properly remarked *, that a canula cannot be kept above ten or fourteen days in the bladder, but with the riſk of contracting a calculous cruſt, that renders its extraction both difficult and painful. The canula, therefore, ſhould be taken out and cleaned, from time to time. This has commonly been done, by paſſing a firm probe of a ſufficient thickneſs through it into the bladder, upon which the canula is again returned, on being cleared of the incruſtation. Inſtead of a probe, however, I have employed a tube that anſwers better. This tube is made to fit the diameter of the canula exactly, but at the ſame time to paſs eaſily through it; and it has this advantage over a probe, that in the event of it proving difficult to return the canula of the trocar, as ſometimes is the caſe,

* Vid. Critical Enquiry, &c. by Mr Sharpe, Chap. IV.

caſe, the tube may be retained; and being nearly of the ſame diameter, it anſwers the purpoſe equally well. Of this tube, and the mode of applying it, I have given a delineation and deſcription in Plate LX.; and in Plate LXI., I have delineated a very neat apparatus for puncturing the bladder above the pubes, by Dr Monro.

In puncturing the bladder from the perinæum, the patient ſhould be placed upon his back on a firm table; and his thighs being ſeparated, and properly ſecured by aſſiſtants, an inciſion ſhould be made of an inch and half in length, beginning at the commencement of the membranous part of the urethra, and proceeding towards the anus, in a line parallel to, but at leaſt half an inch diſtant from, the rapha perinæi. In this manner the ſkin and cellular ſubſtance ſhould be freely divided; which puts it in the power of the operator not only to introduce the trocar with more eaſe, but to avoid the urethra with

more certainty than he otherwiſe could do.

This being done, as the bladder is always much diſtended when this operation is neceſſary, it is eaſily diſtinguiſhed with the finger at the bottom of the wound: But, whether it is felt by the finger or not, we ſhould not heſitate to puſh in the trocar a little above, and to the left of the proſtate gland, which, when the parts have been freely divided, is eaſily diſcovered; and if the point of the trocar is paſſed up towards the pubes, there can be no danger of hurting either the ureters or vaſa deferentia, which ſome have been afraid of in this operation; and at the ſame time there muſt be an abſolute certainty in this direction, if the trocar is carried to a ſufficient depth, of its reaching the bladder.

It has been alleged, and with ſome reaſon, that in this part of the operation the ſurgeon muſt be at a loſs to know when the inſtrument has reached the bladder; and ſeveral inventions have been propoſed, to obviate this inconvenience. In Plate LVIII.

LVIII. fig. 5. is repreſented a very ſimple contrivance for this purpoſe: It conſiſts of a trocar, with a canula of the uſual form, and a deep groove in the ſtilette, ſo that urine begins to flow along the groove, immediately on the inſtrument having entered the bladder. As ſoon, therefore, as in this manner we know that the trocar has paſſed to a ſufficient depth, the ſtilette ſhould be withdrawn; when the canula ſhould be ſecured by two pieces of tape, connected with two rings upon its brim, being firmly tied to a circular bandage round the body: And if one of theſe tapes is tied behind immediately above the ſacrum, and the other directly above the pubes, the canula will not be eaſily diſplaced.

It is equally neceſſary here as when the operation is done above the pubes, to change the canula, or at leaſt to clean it from time to time; and in this ſituation too, ſo long as a canula is employed, the urine may be retained and drawn off at

pleaſure, by a plug of cork being fixed in it.

In perforating the bladder from the rectum, the patient ſhould be placed upon his back, and ſecured with aſſiſtants in the manner I have pointed out: The ſurgeon now inſerts the fore-finger of his left hand into the rectum, and having carried the point of it about an inch above the proſtate gland, where the bladder in this diſtended ſtate of it is eaſily felt, a curved trocar about two inches and a half in length, ſhould be paſſed along the finger, and puſhed at this prominent part of the bladder, in an oblique direction upwards till it reaches the urine. In this ſituation, the canula muſt either be retained by being fixed with pieces of ſmall tape to a circular bandage round the body, or a tube of reſina elaſtica ſhould be inſerted through it, and left in the opening till the urine paſſes off by the urethra.

This operation has now been frequently practiſed, but it is liable to ſo many important objections, that I do not ſuppoſe that

that it will ever be generally adopted. It is eaſily performed, but this is almoſt the only circumſtance that tends to recommend it. The chief objections to it are, the riſk incurred by it, of wounding either the ureters, vaſa deferentia, or veſiculæ ſeminales, while, at the ſame time, it forms a paſſage, by which the fæces may find acceſs to the cavity of the bladder, that would either ſoon end in the death of the patient, or leave him in a ſtate of very miſerable exiſtence. Much irritation and diſtreſs muſt alſo enſue from a canula being left in the rectum during the cure, that is, till the urine paſſes off by the natural conduit of the urethra, which, in ſome inſtances, does not happen in leſs than a year or two, while in others the ſtoppage continues during life. Mr Weldon, who has written an ingenious treatiſe on this ſubject, indeed ſays, that the canula may be withdrawn ſoon after the operation, and the urine allowed to paſs off by the opening*. But, beſides the very uncomfortable

* Vide Obſervations on the different modes of puncturing the bladder, by Walter Weldon, ſurgeon.

comfortable ſtate to which this would reduce the patient, by having his urine at all times paſſing off by the rectum; the opening would often be apt to heal from time to time, by which the operation might be frequently to renew.

I have thus deſcribed the different modes that have been propoſed of puncturing the bladder. In appreciating the merits of each, I was at one time of opinion, that doing it from the perinæum was the beſt; and in the former editions of this work, I freely ſaid ſo. I now, however, think it right to ſay, that farther experience has convinced me that I was wrong. Every method of performing this nice operation, is attended with difficulties. I have already enumerated thoſe that chiefly apply to the mode of doing it from the rectum. To the perforation above the pubes, it is objected, that the cavity of the abdomen may be pierced with the trocar; that the bladder may be injured, by being ſuſpended for a conſiderable time upon the canula; that it may even ſlip off from the end of the

the canula, by which all the urine will eſcape, and lodge in the pelvis; that the end of the canula may injure the back part of the bladder; and that the urine, inſinuating into the cellular ſubſtance of the contiguous parts, may terminate in various diſtreſsful ſymptoms.

It may be obſerved, however, in anſwer to theſe difficulties, that where the operation is properly conducted, few or none of them ever occur. It can ſeldom or never be neceſſary to puncture the bladder, till it is ſo much diſtended with urine, as to be conſiderably raiſed above the pubes; in which ſituation, there is no riſk of puſhing the trocar into the abdomen. A ſuppreſſion of urine may no doubt happen, where the bladder, by diſeaſe, is ſo much contracted, that this degree of diſtention cannot, conſiſtently with the ſafety of the patient, be permitted. I conclude, however, that this is uncommon, as I have never yet met with it; and wherever it takes place, the diſeaſed ſtate of the bladder will give little or no chance

chance to the operation, wherever it may be performed. I know from experience, that the bladder is not apt to be hurt by being ſuſpended on the canula; and I conclude that this may, in ſome meaſure, happen, from thoſe attachments that commonly take place in this diſeaſe, between the bladder and contiguous parts, as the effect of the inflammation, with which a ſuppreſſion of urine is for the moſt part attended. Thoſe adheſions of the bladder to the contiguous parts, may alſo in ſome meaſure tend to prevent the bladder from ſlipping off from the canula; but this accident can never poſſibly happen, if the trocar is not introduced with too much obliquity downwards. Neither will the back part of the bladder be hurt by the canula, if the directions I have given, in regard to the length of it, are kept in view, and if the blunt ſilver ſtopper, Plate LX. fig. 3. is always kept in it, except when the patient is voiding urine.

That diſtreſsful ſymptoms may enſue, from the urine finding acceſs to the contiguous

guous cellular ſubſtance, none will doubt, but I have now much reaſon to think that it is an uncommon occurrence in this operation.

In perforating from the perinæum, to which at one time I gave the preference, the urine is ſtill more apt to eſcape from the wound, into the contiguous cellular ſubſtance; although this is by no means the moſt important objection to the operation being done in that ſituation. The chief danger here, ariſes from the near contiguity of very important parts, the urethra, proſtate gland, ureters, vaſæ deferentiæ, and veſiculæ ſeminales, which being all near the neck of the bladder, and therefore apt to inflame, whenever the urine is long ſuppreſſed, they muſt neceſſarily be more ſeverely injured, by the trocar paſſing near them, and by their being freely expoſed to the air, by the deep inciſion in the previous ſteps of the operation, than the upper part of the bladder can poſſibly be, in perforating above the pubes,

and

and accordingly more danger is found to attend it.

I am therefore of opinion, on a comparative view of the advantages and diſadvantages of theſe ſeveral operations, that puncturing the bladder above the pubes is the beſt. I have only further to obſerve, before leaving the ſubject, that in whatever way the operation is done, it ſhould not be long poſtponed after the bladder becomes painfully diſtended: I have often indeed been led to think that more danger has enſued from delay in this ſituation, by which the bladder has appeared to be entirely deprived of its tone, than we almoſt ever meet with from the moſt untoward occurrence in any of theſe modes of operating.

In the operation of lithotomy in females, I mentioned reaſons that appear to be concluſive againſt the method of cutting into the bladder from the vagina; but they do not apply with equal force againſt the propriety of puncturing the bladder in this part. On the contrary, whenever there

there is cauſe for performing this operation in women, it cannot be done in any other way, either with ſuch eaſe or certainty, as from the vagina. When the bladder is much diſtended with urine, it is eaſily diſcovered by the finger in the vagina; and from thence it may with ſafety be pierced with a trocar. The fore-finger of the left hand being paſſed into the vagina, the point of the trocar ſhould be conducted upon it, and puſhed through the vagina into that part of the bladder firſt diſcovered by the finger; for here the ureters run no riſk of being wounded, which farther back they certainly would do. The trocar being freely paſſed into the bladder, and the urine all evacuated, the canula ſhould be left in its place, and continued as long as the cauſe ſubſiſts by which the ſuppreſſion was produced. That the tube may be firmly ſecured, it ſhould be of a ſufficient length for paſſing out at the vagina, and to admit of its being tied to the T bandage, with tapes attached to it.

I think it here, however, proper to obſerve, that in whatever way the bladder is punctured, and whether in male or female patients, if tubes of ſilver irritate and excite pain, as is very apt to be the caſe, that this may in moſt inſtances be prevented by leaving in the paſſage a tube of elaſtic reſin.

CHAP-

CHAPTER XXXII.

Obſtructions in the URETHRA.

IN the preceding ſection, when treating of the cauſes of ſuppreſſion of urine, obſtructions produced by claps, of which caruncles are ſuppoſed to be the moſt frequent, were ſpoken of as the moſt frequent and moſt remarkable.

But although I have particularly mentioned the term Caruncle, by which is meant a fleſhy excreſcence ariſing from the membrane of the urethra, I do not wiſh it to be ſuppoſed that I conſider it to be a frequent occurrence. That ſuch excreſcences are ſometimes met with towards

towards the extremity of the yard, there is no reaſon to doubt; but as I have often diſſected theſe parts, in patients who had long laboured under ſymptoms ſuppoſed to proceed from caruncles in the back-part of the urethra, and as caruncles were not diſcovered in any of them, I am therefore of opinion that their exiſtence in the more remote parts of the urethra is very uncommon. I have often obſerved this kind of production, within a quarter of an inch of the extremity of the urethra, eſpecially where the glans and prepuce have been covered with warty excreſcences of a ſimilar nature; but from having never found them ſpread farther up the canal, although it is not a proof that they never occur in other parts of it, yet this, together with ſome obſervations of a ſimilar nature by Dionis, Saviard, Mr Petit, and others, is ſufficient authority for the opinion I have advanced, that caruncles in the more remote parts of the urethra are rarely met with. Daran indeed often ſpeaks of them; and he no doubt had more practice in diſeaſes

diſeaſes of this claſs than perhaps ever fell to the ſhare of any other individual: But if his works are read with attention, it will appear that his detail is very inaccurate; for he evidently confounds other cauſes of obſtruction, particularly ſtrictures and cicatrices of old ulcers, with, and miſtakes them for, caruncles.

Practitioners in former times, as well as many in more late periods, have doubted ſo little of the frequent occurrence of caruncles, that almoſt every inſtance of obſtructed urethra ſucceeding to a clap has been attributed to this cauſe. What I have here ſet forth will tend to ſet this however in a different view; and I ſhall now proceed to enumerate the different cauſes by which obſtructions in the urethra may be produced.

1. Although I have ſaid that caruncles are rarely met with in the ſuperior part of the urethra, yet they ſometimes form towards the extremity of this canal: They muſt therefore be mentioned as one cauſe of theſe obſtructions. I muſt again ob-

ſerve, however, that where caruncles, or carnoſities as they are ſometimes termed, are met with, they are always of the ſame nature with thoſe warty excreſcences that frequently form upon the prepuce and glans as a conſequence of gonorrhœa.

2. Ulcers in different parts of the urethra have been known to produce very complete obſtructions.

On opening the bodies of thoſe who at the time of death laboured under gonorrhœa, ulceration has very ſeldom been diſcovered; and this gave riſe to the opinion that ulcers of the urethra never take place in gonorrhœa. We now know indeed that very great quantities of matter may be furniſhed by parts merely inflamed, and not in a ſtate of ulceration. But we alſo know, that parts remaining for any conſiderable length of time ſo highly inflamed as to furniſh much pus, are very apt to become ulcerated; and if this happens in other parts of the body, we may conclude that the ſame cauſe will induce the ſame

effects

effects in the urethra. Accordingly, there is no reaſon to doubt of ulcers ariſing in the urethra from inflammation alone; but it is likewiſe certain, that they are ſometimes met with in the urethra from the ſame cauſe by which chancres are produced in the glans, namely, from the mechanical effects of the venereal poiſon, independent of the intervention of any degree of inflammation.

The excretory ducts of the different glands in the urethra, particularly of the proſtate gland, as alſo the ducts of the veſiculæ ſeminales, and the other parts about the verumontanum, have commonly been ſuppoſed to be particularly obnoxious to the effects of the venereal virus; and ulcerations are accordingly ſaid to be more frequent in theſe parts than in others. The reſult of my obſervation, however, has been, that ulcers ſeldom occur in any part of the urethra, but more frequently towards the extremity of the urethra than in other parts of it, and that

they rarely form farther back than an inch or ſo from the point of the yard.

3. Diſſection has ſhewn, that a mere contracted ſtate of the urethra is to be conſidered as the moſt frequent cauſe of obſtruction. In ſome, the ſtricture is confined to one point, while in others different parts of the paſſage are diſeaſed. At one period, I was induced to think that ſtrictures in the urethra were more frequently produced by ulceration than in any other way; but I have now reaſon to think, that they proceed more frequently from that thickened ſtate of the membrane of the urethra that gonorrhœa is apt to excite.

Aſtringent injections are mentioned by many as a frequent cauſe of ſtrictures. Irritating injections, when improperly applied to parts already in a ſtate of inflammation, may no doubt do harm; and, by increaſing the inflammatory ſtate of the urethra, may in this manner produce ſtrictures: But this is not the fault of the remedy, but of the improper uſe of it.

Similar

Similar objections might with equal reaſon be adduced againſt the uſe of every medicine with which we are acquainted; for few remedies are more ſafe in their operation, or more effectual in the cure, than aſtringent injections in gonorrhœa. Obſtinate claps indeed are often cured by injections that cannot be removed in any other way.

4. Tumors in the cellular ſubſtance ſurrounding the urethra, or in any of the glands connected with it, very frequently produce obſtructions in the courſe of it: And inflammation, whether at firſt produced by gonorrhœa, or in any other way, when it terminates in ſuppuration, muſt be apt to induce them. In ſuch caſes, indeed, as ſoon as the matter collected in the abſceſs is diſcharged, the obſtruction produced by it is in general removed: In ſome inſtances, however, this does not happen; for in different caſes I have found, that the compreſſion produced by the tumor has induced ſuch firm adheſion between the ſides of the urethra, as to oblite-

rate the canal entirely. In which caſe, as a total ſtop is put to the natural diſcharge of urine, it burſts out in the perinæum, where one or more openings, communicating with the urethra, are found between the ſeat of the diſeaſe and the proſtate gland.

5. Of all the cauſes of obſtruction, none are ſo frequent as a fulneſs or enlargement of the corpus ſpongioſum urethræ. On diſſecting the penis of ſuch as have laboured long under obſtructions, a partial enlargement or thickening of the ſubſtance of the urethra, often appears to be the cauſe, and it frequently proceeds ſo far as to obſtruct the paſſage entirely.

In ſome, the ſtoppage is confined to a particular point: In others, it is of conſiderable extent; while not unfrequently it attacks different parts of the canal, leaving intermediate parts perfectly ſound.

6. Having thus enumerated the cauſes that moſt frequently produce obſtructions in the urethra, I ſhall now endeavour to point

point out the treatment beſt calculated for their removal.

When the obſtruction is produced by the preſſure of a tumor, our practice muſt depend on the kind and nature of the tumor. Accordingly, when the tumors are hard and indolent, they ought to be extirpated whenever it can be done with ſafety. But although this may be done when they do not penetrate deep, yet when the proſtate gland, or any of the parts about the neck of the bladder, are found to be enlarged, the removal of theſe cannot poſſibly be attempted. In ſuch deſperate caſes, cicuta has been often uſed; but ſeldom, I believe, with advantage. In an ulcerated ſtate of the parts, a plentiful uſe of uva urſi has been known to give relief, and ſome advantage has occaſionally been derived from a gentle courſe of mercury. The effect, however, of mercury, in all affections of this kind is by no means certain; and in the diſtreſs that this variety of the diſeaſe excites, we are frequently reduced to the neceſſity of truſting entire-

ly to the relief which opiates give, and to a plentiful uſe of mucilaginous drinks.

When, again, the tumors proceed from inflammation, if they are not ſoon diſcuſſed, the moſt effectual means ſhould be employed for bringing them to ſuppuration.

Theſe having been enumerated in Chapter I., it is not neceſſary to repeat them, and as ſoon as the formation of matter is accompliſhed, it ought to be diſcharged. In other parts of the body, when an inflammatory tumor is likely to terminate in ſuppuration, we conſider it as good practice not to open the abſceſs till pus is thoroughly formed; but in this ſituation, as much diſtreſs would enſue from delay, the abſceſs ſhould be opened as ſoon as there is cauſe to imagine that the preſſure upon the urethra would be diminiſhed by doing ſo; and this muſt always be the caſe when a fluctuation of matter is evidently diſcovered. In all ſuch caſes, we remove the obſtruction in the urethra with more certainty by diſcharging the matter contained

contained in the abſceſs than by any other means. If, on laying the collection open, however, it is found that the ſtoppage in the urethra is not removed, bougies ſhould be immediately employed. By paſſing a bougie of a proper ſize along the urethra, and allowing it to remain for two or three hours daily, any ſtricture produced by the preſſure of the abſceſs will ſoon be removed.

It ſometimes happens, where abſceſſes in this ſituation have been of long duration, that the urine burſts into the cellular membrane of the perinæum and other contiguous parts, and from thence forms one or more external openings. One of the moſt diſtreſsful ſituations is in this manner induced, to which the human body is liable, a diſeaſe of which we ſhall more particularly conſider in ſpeaking of fiſtula in perinæo. In the other caſes of obſtructed urine, proceeding from caruncles when they happen to occur; from ulcers, and the cicatrices which they produce; from ſtricture and contraction of the urethra;

or

or from an enlarged and thickened ſtate of the corpus ſpongioſum urethræ, we depend almoſt entirely on a proper application of bougies, a remedy that proves chiefly uſeful by its mechanical action on the obſtructed part. It has been alleged, indeed, by many, particularly by Mr Daran and Mr Sharpe, that, in removing caruncles and other cauſes of obſtruction, bougies prove more uſeful by what they term their Suppurative quality, than by any other property: By which they mean to ſay, that bougies may be compoſed of ſuch materials as will induce a ſuppuration upon the caruncles to which they are applied; and that this ſuppuration, if continued for a ſufficient length of time, will ultimately deſtroy all the diſeaſed parts *.

This

* For Mr Daran's account of this matter, ſee his Treatiſe on Diſeaſes of the Urethra: And Mr Sharpe's account of it may be ſeen in his Critical Enquiry, chap. vi. Although Mr Sharpe is clearly of opinion, that the principal advantage derived from bougies proceeds from their influence in inducing ſuppuration, yet, whenever he argues on this with accuracy, he is obliged to

This idea, although founded on inaccuracy, continues with many ſtill to prevail: Little argument, however, is required to ſhew that bougies act chiefly by their mechanical preſſure, and not by the ſuppuration which they excite. Among other reaſons that might be given as proofs of this, I ſhall only mention the following.

1. Thoſe who allege that bougies prove uſeful only by inducing ſuppuration, are obliged to affirm that obſtructions to the paſſage of urine ariſe moſt frequently from caruncles in the urethra; and that the ſuppuration produced by the bougies, tends to deſtroy, or as it were to diſſolve, them; but although theſe excreſcences may

to acknowledge, that by their preſſure alone they prove uſeful: For he ſays, "That though I have a great opinion of the good effects produced by the ſuppuration, yet I believe alſo, that bougies operate by diſtending the urethra; and I will go ſo far as to give it as my judgment, that even the cures done by Mr Daran are wrought partly by diſtention, and partly by ſuppuration; though he himſelf aſcribes them to ſuppuration only." Vide page 171. fourth edition, loc. cit.

may ſometimes prove the cauſe of obſtructions, yet, as I have already endeavoured to ſhew, they are very rarely met with. It muſt therefore follow, if this idea of the cauſe of the diſeaſe is ill-founded, that the ſuppoſed modus operandi of the remedies employed in it muſt likewiſe be erroneous; for every practitioner who gives attention to this branch of his profeſſion, muſt acknowledge, that bougies prove much more frequently uſeful than the cauſe upon which they have been ſuppoſed chiefly to operate is found to exiſt. Indeed, the general utility of bougies in obſtructions of the urethra, muſt be acknowledged by all who have uſed them, while ſcarcely any advantage is derived from any other remedy.

2. But although we ſhould allow that caruncles are frequently formed in the urethra, we cannot admit that ſuppuration induced upon them would have much influence in removing them.

We know, that in other parts of the body, warts and other hard excreſcences cannot

cannot be carried off merely by matter being formed upon them; and we cannot ſuppoſe that in this there is much difference between warts in the urethra, and thoſe which form in other parts of the body.

3. It has been ſaid, that theſe bougies, while they act by inducing ſuppuration, have likewiſe ſome influence as eſcharotics; and that many of Mr Daran's bougies, the compoſition of which was kept ſecret, were evidently poſſeſſed of this property.—Mr Daran, in order to render the operation of his remedy as myſterious as poſſible, did indeed allege, that his bougies were endowed with many virtues: But no candid practitioner will ſay, that bougies poſſeſſed of a degree of cauſticity ſufficient to deſtroy warts, can with propriety be paſſed into the urethra; for, if of ſuch a ſtrength as to corrode theſe excreſcences, they would neceſſarily injure the whole of the urethra to which they are applied.—Indeed, the mildeſt materials we can employ frequently ſtimulate too much:

much: For, upon withdrawing any bougie that has remained long in the urethra, it is almoſt always found covered with purulent matter. It is this indeed I imagine, that firſt ſuggeſted the idea of bougies acting by inducing ſuppuration; which, however, is to be conſidered only as a neceſſary effect of a ſtimulus applied to a ſenſible membrane, being in no reſpect eſſential to the cure of the diſeaſe for which the bougie is uſed.

4. But without having recourſe to the ſuppurative or eſcharotic effects of bougies, the advantages commonly derived from them may, as I have already endeavoured to ſhew, be eaſily explained upon the principle of mechanical preſſure alone.

I have thus thought it proper to conſider the action of bougies with minuteneſs; for till the opinion is exploded of medicated bougies, as they are termed, being neceſſary, much miſchief may be done, by forming them of irritating or even of eſcharotic materials, as is ſometimes the caſe,

caſe, inſtead of rendering their compoſition mild and inoffenſive, as in every inſtance it ought to be.

The opinion that I have endeavoured to eſtabliſh being admitted, namely, that bougies ſhould operate ſolely by mechanical preſſure, it muſt neceſſarily follow, that, in the formation of bougies, much will depend on their being of a proper conſiſtence; neither too hard nor too ſoft. When too ſoft and compreſſible, they cannot act with advantage againſt the obſtructing cauſe, and againſt which preſſure is intended to be applied; and when too hard, they are apt to crack, and are neither introduced into, nor retained in the urethra, with ſo much eaſe as when formed of a proper conſiſtence: Bougies ought likewiſe to have a ſmooth poliſhed ſurface, to facilitate their introduction; and laſtly, they ought, as I have already remarked, to be compoſed of very mild materials, ſo that they may excite as little irritation as poſſible.

Various

Various formulæ have been given for bougie plaſters; and of theſe the following are perhaps the beſt.

No. 1. ℞. Emplaſt. Diachyl. ſimp. ℥iv.
Cer. puriſſ. ℥iſs.
Ol. Oliv. opt. ℥iii.

No. 2. ℞. Emplaſt. commun.
Spermat. Cet. aa ℥iv.
Ol. Oliv. opt. ℥ſs.
Minii, ℥ſs. M.

No. 3. ℞. Emplaſt. commun. ℥vi.
Ceræ flavæ puriſſ.
Spermat. Cet. aa ℥ii.
Ol. Oliv. opt. ℥i.
Antimon. crud. pp^tt. ℥ſs. M. S. A.

Any of theſe preſcriptions afford a good compoſition for bougies. They require to be ſlowly melted, and the different articles to be well mixed together. No. 1. is the ſimpleſt, and perhaps the beſt; the red lead in No. 2. and antimony in No. 3. being added chiefly for the purpoſe of affording

fording a variety of colour. No. 4. is a compoſition for bougies recommended by Mr John Hunter *; and No. 5. by Mr Sharpe †.

No. 4. Take oil of olives, three pints;
Bees wax, one pound;
Red lead, one pound and a half.

Let them be boiled together on a ſlow fire for ſix hours.

No. 5. ℞. Diachyl. cum pice Burgund. ℥ii.
Argent. viv. ℥i.
Antimon. crud. ppᵗᵗ. ℥ſs.

The quickſilver to be previouſly diſſolved in balſam of ſulphur, or in honey, and added to the plaſter when melted in a moderate heat.

Any of theſe compoſitions, when boiled to a proper conſiſtence, will anſwer for the formation of bougies, which is done in

* See Treatiſe on the Venereal Diſeaſe, p. 137.

† See Critical Enquiry by Samuel Sharpe, F. R. S.

the following manner: While the liquid ſtill continues warm, let a piece of fine old linen be dipped in it, taking care with a ſpatula to cover the whole. If the melted liquor be of a proper heat, no more of the plaſter will adhere to the linen than is neceſſary; but as air bubbles are apt to ariſe and produce inequalities on the ſurface of the cloth, the ſpatula made uſe of ſhould be ſomewhat warmer than the plaſter, and by means of it the whole ſhould be made ſmooth. The plaſter might indeed be ſpread entirely with the ſpatula; but this is not only attended with more trouble, but it does not cover the cloth with ſufficient equality.

The cloth being ſufficiently cold, may be immediately formed into bougies, and the whole ſhould, in the firſt place, be cut into the number that is meant to be made. The moſt exact method of doing this is by means of a ſharp-pointed knife, directed by a rule. The pieces ſhould be eleven inches in length for bougies of a full ſize; but they ſhould likewiſe be kept

of

of all the variety of lengths for ſtrictures of different heights in the urethra.

A variety of directions have been given for the form of bougies. Some adviſe them to be made nearly of an equal thickneſs to within an inch of their ſmalleſt end, and to taper from that to the point, while a great proportion of them are made to taper to within an inch or two of the point, and the reſt of them are cylindrical. I once thought that this laſt form of bougie was the beſt; but after a long courſe of experience in this branch of buſineſs, I am now convinced, that bougies, which taper equally from one end to the other, are the beſt, and that this form anſwers equally well for every variety of ſize. They are introduced more eaſily, and with leſs pain than any of the others; the linen ſhould therefore be cut in ſuch a manner as to give this form to the bougies. When rightly ſpread, and the linen ſufficiently fine, a well ſhaped bougie will be formed of a ſlip of about five-eighths of an inch broad at its largeſt end, and ſome-

what more than three-eighths at the ſmalleſt end. This forms a bougie of a middle ſize; for particular purpoſes they muſt be conſiderably larger, and for others not ſo large by a great deal.

The ſlips of linen are now to be rolled up as neatly as poſſible with the fingers; and in order to give them a ſmooth poliſhed ſurface, they ſhould be ſmartly rolled between a piece of ſmooth hard timber and a plate of fine poliſhed marble: This being continued till the whole are rendered perfectly ſmooth and firm, and their points being properly rounded, in order to facilitate introduction, they are in this ſtate to be kept for uſe.

Theſe directions will convey an idea of the method of preparing bougies, but no ſurgeon can ever become ſo expert in forming them as artiſts daily accuſtomed to prepare them in large quantities. I muſt here, however, remark, that bougies, properly prepared with reſina elaſtica, are preferable in many circumſtances to ſuch as are made with any kind of plaſter. They

They not only prove much more durable, but more force can be employed with them, and as they do not break or crack by continuing in the urethra, they remain in it with leſs pain and inconvenience than any other bougie that has yet been invented.

Catgut has frequently been uſed as a bougie; but after various trials being given to it, I do not find that it anſwers the purpoſe: it cannot be made ſufficiently ſmooth; and it ſometimes ſwells ſo much as to excite a good deal of irritation; and lead, which was one of the firſt articles uſed for bougies, is ſo firm that it always creates much pain, while it is ſo apt to break, that different inſtances having occurred of this, it has now been long laid aſide.

We come now to the application of the bougie.—A bougie muſt be choſen adapted to the ſize of the paſſage through which it is to paſs, and well covered with fine oil: The penis being firmly graſped and extended with one hand, the end of the bou-

gie muſt be inſerted into the urethra with the other; and being puſhed forward with caution, it is in this manner to be carried on till it meets with the cauſe of obſtruction; when, if a moderate force makes it paſs, our object is ſo far accompliſhed: But if, after different attempts, it cannot be eaſily carried forward, it ſhould be immediately withdrawn; and at next trial, which, in order to avoid any riſk of inflammation, ſhould not be made for two or three days, a bougie with a ſmaller point ſhould be employed.

Much nicety is required in this part of the operation; for, by proceeding ſlowly, with due care and caution, every riſk may be avoided of injuring the urethra, at the ſame time that the object in view may be often accompliſhed with more certainty than when much force is employed. As ſoon as we reach the cauſe of obſtruction, if a bougie of the ſmalleſt ſize is employed, inſtead of puſhing it on with force, as to a certain degree may be done with a catheter, it anſwers the purpoſe with more certainty

certainty to twirl it between the finger and thumb, ſo as to make it preſs moderately upon the part that it ought to paſs. But, on the other hand, although miſchief has often accrued from too much force being uſed with bougies, and although every practitioner ſhould therefore be warned of the danger; yet, when much reſiſtance is met with, they muſt neceſſarily be preſſed on with firmneſs. If this, however, is done with caution, and in a proper direction, which experience alone can teach, it may very commonly be accompliſhed. It often happens, indeed, unleſs a tolerable degree of force is employed, that bougies will not paſs, and no benefit will therefore be derived from them; for unleſs they are made to paſs the point of obſtruction, they cannot operate with advantage.

This, I muſt obſerve, is a point of much importance, and ought to be kept in view. For although no unneceſſary force ſhould be ever employed, yet we commonly meet with too much timidity; for, in ordinary

practice, if the bougie meets with unuſual reſiſtance, and if it cannot, on the firſt or ſecond attempt, be introduced, the caſe is commonly conſidered as deſperate, and no further trials are made. I can from much experience, however, ſay, that few caſes occur, in which bougies, by a frequent repetition of cautious trials, may not be introduced. Even where I have been convinced that the paſſage of the urethra has at a particular point been entirely obliterated by the ſides of it adhering to each other, and where the urine has long been voided by openings in the perinæum, the bougie, with a due degree of force properly applied, has at laſt proved ſucceſsful.

In ſome inſtances, bougies with ſmall points will paſs, when others of a larger ſize will not penetrate; but, in general, when the obſtruction is found to be unuſually firm, thoſe of a middling ſize are preferable to ſuch as have ſmall points: For bougies of this form are apt to bend if they do not paſs forward at once; and as ſoon

ſoon as the point yields in any degree, the bougie ſhould be withdrawn, as it cannot afterwards be puſhed forward; for if more force is employed, inſtead of being carried farther into the urethra, it becomes twiſted, and excites pain in the extraction *.

By different cautious trials, the bougie will for the moſt part be made to paſs the different points of obſtruction; and this being done, as bougies have ſometimes ſlipped entirely into the urethra, and even into the bladder itſelf, this ought to be carefully guarded againſt, by a piece of cotton-thread connected with the extremity of the bougie, being either tied round the penis behind the glans, or to a circular belt paſſed round the body.

Certain regulations have been held forth by authors for the time that bougies ſhould be kept in the urethra: But with ſome patients

* With a view to give more firmneſs to bougies, Mr Deaſe, an ingenious ſurgeon of Dublin, recommends their being formed upon catgut.—*Vid.* Obſervations on the different Methods of treating the Venereal Diſeaſe, by William Deaſe, Dublin.

tients they excite a good deal of pain, while with others they give little or none; and as it is the degree of pain that they induce which ought to regulate the time that they remain in the urethra, nothing deciſive, it is evident, can be ſaid with reſpect to it. When they excite much pain, they ſhould neither be allowed to remain long at once, nor ſhould they be uſed above once in two or three days: But when they can both be eaſily introduced and retained in the urethra, they ſhould be inſerted often; for as it is by their preſſure alone that they prove uſeful, and as this muſt be continued for a certain length of time, according to the cauſe of the obſtruction, the more conſtantly the bougie is uſed, the more quickly a cure will be performed; and with the ſame view it ſhould be gradually increaſed in ſize, till the largeſt can be inſerted that the urethra will admit.

When bougies excite irritation, they ſhould never be employed but when the patient can confine himſelf to his apartment;

ment; but with many the diſtreſs that they induce is ſo inconſiderable, that they can walk eaſily with bougies of the largeſt ſize inſerted along the whole courſe of the urethra. I always adviſe, however, the patient to remain at reſt while a bougie is in the urethra.

Nothing certain can be ſaid of the length of time that bougies ſhould be uſed, as this muſt be always regulated by their effects; which, again, will in a great meaſure depend on the nature of the obſtruction. This, however, I can with freedom propoſe, that they ſhould be continued, not only while any difficulty in paſſing water remains, but for a conſiderable time thereafter.

In the uſe of bougies, care ſhould be taken not to puſh them into the bladder: For, even when prepared of the beſt materials, a portion of the compoſition may crack and fall off; and if this ſhould not paſs off with the urine, it may be the cauſe of much diſtreſs, by ſerving as a nucleus for a ſtone.

Flexible

Flexible catheters of various kinds have been invented for the purpoſe of remaining in the urethra, and for anſwering both the intention of catheters and bougies. Various methods of forming theſe inſtruments have been propoſed; but the moſt convenient of any that I have ſeen, is either a tube of reſina elaſtica, or one of flexible ſilver wire, wrapped ſpirally round a ſteel probe of a proper length and thickneſs; and this being neatly covered with fine linen ſpread with bougie-plaſter, and the probe upon which it was formed being withdrawn, the inſtrument is thus completed; only it muſt be afterwards furniſhed with a ſilver wire or cleanſer, in a ſimilar manner with other catheters.—Theſe inſtruments, however, do not prove ſo uſeful as was once expected; but when it is ever neceſſary to allow a catheter to remain long in the urethra, one of this flexible form anſwers the purpoſe exceedingly well. It muſt, however, be remembered, that as theſe catheters are covered with plaſters, they ſhould not be allowed to remain long in

in the bladder, for the ſame reaſon that bougies ought not to be inſerted into it. When it is neceſſary to leave a flexible catheter in the bladder, thoſe that are compoſed of reſina elaſtica ſhould be employed, as the adheſive property of this ſubſtance prevents it from cracking and falling off, as plaſters of every kind very commonly do.

When ſpeaking of the formation of bougies, I have ſaid, that as it is chiefly by mechanical preſſure they prove uſeful, ſo a proper conſiſtence is the principal circumſtance to be kept in view in their compoſition. This, I muſt again ſay, ſhould be our leading object in the employment of bougies: But when there is reaſon to think that chancres, or venereal ulcerations, exiſt in any part of the urethra, as nothing would cicatriſe the ulcers ſo quickly as a local application of mercury, a large proportion of quick-ſilver extinguiſhed in honey may with advantage be added to the compoſition, as in the formula given above, No. 5. As mercury in this ſtate excites little or no irritation, it

may

may be uſed with freedom.—Red precipitate in fine powder has alſo been adviſed as a proper ingredient in bougies, not only to be applied in this manner to ulcers in the urethra, but with a view to corrode other cauſes of obſtruction: This, however, is a practice that ought to be laid aſide, as the precipitate is very apt to ſtimulate and inflame the membrane of the urethra.

I have thus entered fully into the conſideration of the uſe of bougies. Indeed, too much attention cannot be given to a practice from which ſuch important advantages may be derived: For by a proper application of bougies, almoſt every cauſe of obſtruction that I have enumerated may be either cured, or at leaſt greatly relieved; and were it not for the advantages derived from bougies, almoſt every caſe of obſtruction would terminate in the moſt complete degree of miſery.

Before concluding the ſubject, I muſt not omit to mention the effect of bougies in ſome caſes of troubleſome gleets.—Whenever this kind of diſcharge is kept up by

by an excoriation or ſlight ulceration of the urethra, or by any of the common cauſes of ſtricture, as is ſometimes the caſe, no remedy proves ſo effectual as bougies; and even in ordinary caſes of gleet, proceeding from a relaxed ſtate of the excretory ducts opening into the urethra, nothing proves more certainly uſeful than the compreſſion induced by bougies.—Whether they operate by affording ſupport to the relaxed membrane of the urethra, or by inducing ſome degree of inflammation upon the parts affected, I know not; but in many inſtances of obſtinate gleet, bougies have been found to anſwer, when other remedies have failed.

Hitherto I have conſidered obſtructions of the urethra in male ſubjects only; but the ſame diſeaſe alſo occurs in women: Even in females, bougies are often uſed with advantage; but in women, tumors of ſuch a ſize ſometimes form in the urethra, as cannot poſſibly be cured by this remedy; and as the urethra in females is not only ſhort, but much wider than in

men,

men, theſe tumors may in them be often removed, either with ligatures or with the ſcalpel.—Nay, we know from experience, that a tumor adhering even to the bladder itſelf, may, in women, be taken off with ſafety. In ſuch caſes, there is a neceſſity for laying the urethra open; which may be done at either of the ſides, and without any riſk of wounding the vagina; and if an inciſion is here made with freedom, any tumor ſituated even near to the neck of the bladder, may be ſo far pulled down as to admit of the application of a ligature; and whenever this can be done, the attempt may be made without hazard.

A remarkable inſtance of this is related by Mr Warner, where a tumor of the ſize of a turkey's egg, produced from the internal membrane of the bladder, was extirpated with a ligature, and with moſt complete ſucceſs *. When ſuch tumors are not ſo large as totally to obſtruct the urine,

* Vid. Caſes and Remarks in Surgery, by Joſeph Warner.

urine, or to be productive of much diſtreſs, a prudent practitioner would rather decline to meddle with them. But when the reverſe of this is the caſe, and when the urine is paſſed with difficulty, neceſſity points out the propriety of this operation; and it muſt be comfortable for a patient, in a ſituation that would otherwiſe be deſperate indeed, to know that a remedy can with ſafety be employed from which a cure may be obtained.

It has been adviſed even by practitioners of reputation, when obſtructions of the urethra proceed from caruncles, or carnoſities, as they are termed, to deſtroy them with lunar cauſtic; and inſtruments have been invented for applying the cauſtic to the diſeaſed parts, Plate LXXIX. figs. 1. 2. and 3.: but the riſk of injuring the contiguous parts, even when the cauſtic is guarded in the moſt cautious manner, is evidently ſo great, as muſt for ever prevent the practice from getting into general uſe.

This I ſtill venture to predict, notwithſtanding all that has been ſaid by Mr Everard Home in recommendation of the uſe of cauſtic: Mr Home has no doubt removed obſtructions in the urethra with cauſtic; but he has ſo frequently failed, after putting patients to ſevere pain, and after the moſt complete trials were given to his plan, that wherever it has ſucceeded, I have much reaſon to believe that due perſeverance in the uſe of common bougies would have anſwered equally well; while no riſk, and not the twentieth part of the pain, would have been the effect of their application: The cleareſt proof, indeed, that can be given of the inefficacy and danger of the uſe of cauſtic in obſtructions of the urethra, is obtained from its having been laid aſide after being put fully to the teſt of experience more than a century ago, as well as from the practice being ſtill confined almoſt entirely to the hands of Mr Home; no practitioner of experience of whom I have heard, either in London, here, or elſewhere, having been induced to adopt

adopt it, after all the trials that have been made with it: This I have been led to ſay from the baneful influence which I have much reaſon to believe would reſult from the uſe of cauſtic in diſeaſes of the urethra, were the practice ever to be generally adopted; and I ſpeak to its inefficacy, not from doubtful ſpeculation, but from ample experience.

CHAPTER XXXIII.

Of the FISTULA in PERINÆO.

BY the term Fiſtula in Perinæo is meant, a ſinuous ulcer of this part, communicating moſt frequently with the urethra only, but in ſome inſtances directly with the body of the bladder. The term, however, is not ſtrictly confined to this acceptation; for it is alſo applied to ſome ulcers of this part that communicate with the ſcrotum and penis.

The term Fiſtula ſhould with propriety be reſtricted to that variety of ſinus in which the edges of the ſore have become hard and callous; but cuſtom now applies it indiſcriminately to every ulcer that

is

is not ſuperficial, but which lies deep, and diſcharges its contents by one or more narrow openings in the external teguments.

In conſequence of the latitude given to the meaning of the term Fiſtula, many appearances are exhibited under this general denomination of Fiſtula in Perinæo. In ſome, a ſingle opening is met with in the teguments of the perinæum or penis, diſcharging matter mixed with urine: This, in ſome inſtances, is not even accompanied with hardneſs or inflammation of the contiguous parts, but in others, inſtead of this ſimple form of the diſeaſe, along with one or more external openings communicating with the urethra, at which all, or at leaſt the greateſt part, of the urine is paſſed, the parts contiguous to theſe openings are much diſeaſed. In ſome they are found merely hard or callous, without much enlargement; but in others they are not only hard, but much ſwelled, inflamed, and painful. In a few, this hardneſs and enlargement is confined

to a ſmall ſpace; but moſt frequently, when the diſeaſe has been of long continuance, it extends nearly from the anus to the ſcrotum, reducing the whole perinæum to a ſtate of calloſity. In many, the malady does not ſtop here: The ſcrotum, and even the penis, becomes diſeaſed; and when the urine at laſt eſcapes into the cellular ſubſtance of theſe parts, particularly when it lodges in the ſcrotum, it never fails to excite a great deal of miſchief.

In conſidering this diſeaſe, the cauſes by which it may be produced, firſt merit attention. They are in general as follow:

1. Wounds and other injuries of the urethra and bladder, in whatever manner they may be produced.

In the old method of performing lithotomy by the apparatus major, the parts were ſo much bruiſed and lacerated, that the wound ſeldom healed kindly, and frequently became fiſtulous; but when the operation is well performed, according to the preſent improved method, this ſeldom happens.

happens. From ſome cauſe or other, however, it happens in a few inſtances, that the urine does not flow freely by the penis; and finding a ready paſſage by the wound, it continues to come off in this manner, till the edges of the ſore becoming callous, the diſeaſe in queſtion is produced. In ſome, a direct communication is kept up between the neck of the bladder and the ſore; but in others, the urine paſſes firſt into the urethra, and from thence is diſcharged by the wound in the perinæum.

Fiſtulous openings are ſometimes the conſequence of inciſions made into the urethra, for the purpoſe of extracting ſtones that lodge in it.

2. Inflammation in any part of the urethra by whatever cauſe it may be induced, if it terminates in an abſceſs, is very apt to corrode the membrane of this canal, and to produce a ſinuous opening, at which the urine is diſcharged. This, I may remark, is not an unfrequent conſequence of virulent gonorrhœa: For when

the inflammation ſpreads along the perinæum towards the anus, if it be not quickly removed by blood-letting, and ſuch other means as are employed, it is very apt to terminate in ſuppuration.

Abſceſſes that form originally in the ſoft parts about the anus, are alſo known to give riſe to it, by exciting inflammation and ſtricture, terminating in ſuppuration, in the cellular ſubſtance connected with the urethra.

3. The ſeveral cauſes enumerated in the laſt Chapter inducing obſtruction of the urethra, by impeding the free diſcharge of the urine, frequently give riſe to the diſeaſe now under conſideration; and accordingly we find that fiſtulous ſores in the perinæum are very commonly connected with an obſtructed ſtate of the urethra.

As the diſeaſe may thus be induced by various cauſes, it is neceſſary to have theſe in view in the courſe of the cure. In order, however, to render this very perplexing branch of practice as obvious and

ſimple

ſimple as poſſible, it is neceſſary to remark, that the different cauſes that I have enumerated, tend to the production of the diſeaſe by two general effects only:

1. By the formation of a paſſage directly into the urethra or bladder, either by external violence, or by the deſtruction of part of the membrane of the urethra, as a conſequence of ulcers ſeated in it, or of matter collected in abſceſſes tending to abrade its ſubſtance; this, we ſuppoſe, may occur, independently of any obſtruction to the paſſage of the urine.

2. By the ſole influence of obſtructions in the urethra: Theſe, by putting a ſtop to the free evacuation of urine, at firſt induce a fulneſs and tenſion of the urethra, which, if not quickly removed, very commonly terminates in a complete rupture of this canal.

In the treatment, therefore, of this diſeaſe, we are to be directed by one or other of theſe general effects; and it is to be remarked, that in no diſeaſe is it of more importance to diſtinguiſh accurately

ly between the cauſes by which it is induced. When the opening in the urethra has been produced by previous obſtruction, no external application, nor any remedy directed to the ſyſtem, will have any effect; while a proper and long continued uſe of bougies, by removing the obſtruction, will ſeldom fail. And, on the other hand, when the diſeaſe has not originated from obſtruction, but has been induced by a ſimple opening in the urethra, bougies are not only very unneceſſary, but frequently do harm.—This, I muſt obſerve, is a diſtinction not ſufficiently attended to in practice. Affections of this kind are commonly treated with bougies only, whatever may have been the cauſe by which they were induced; but we ſhall ſoon make it appear that this muſt frequently be wrong.

In the cure of fiſtulous ſores of theſe parts, it is a matter of the firſt importance to diſtinguiſh between ſuch as are merely local, and thoſe that are connected with any general diſeaſe of the ſyſtem. For however

however well our means of cure might be directed to the topical management of the ſores, if the patient at the ſame time laboured under lues venerea, ſcrofula, or ſcurvy, no permanent cure could be expected, if the diſeaſe of the conſtitution were not to be removed.

Where a fiſtulous ſore is produced by ſtrictures in the urethra, bougies is the only remedy we can truſt; and when properly applied, they very commonly ſucceed. They ought to be continued till the ſtrictures are entirely removed, when the urine being freely and eaſily paſſed, the ſores which the ſtrictures had induced, very commonly heal; but when they do not heal, the cure is for the moſt part found to be checked by the edges of the ſores having become hard or callous; and till this ſtate of the parts is removed, no progreſs towards amendment is to be looked for.

We are therefore to deſtroy theſe callous edges of the ſore, as ſoon as it is found that the bougies do not ſucceed; and the method

method of doing it is this: The patient muſt be laid upon a table, in nearly the ſame poſture as in the operation of lithotomy; and a ſtaff being introduced into the urethra, and made to paſs the opening at which the urine is diſcharged, it is in this ſituation to be held firm by an aſſiſtant; while the ſurgeon, introducing a ſmall probe or director at the external opening of the ſore, and cutting upon it in the direction of the ſinus, is thus to lay it open through its whole length, till it terminates either in the urethra, or, if neceſſary, in the bladder itſelf.

When more ſinuſes than one are diſcovered, they muſt all be laid open in the ſame manner. In ſome inſtances, we meet with different ſinuſes in the cellular membrane, leading from one opening in the urethra; while, in others, there are as many openings in the urethra as external ſores or ſinuſes. This, however, is uncommon: But this is not a matter of importance, as the ſame method of treatment anſwers equally well in both; for whether

whether the different ſinuſes originate from one common opening in the urethra, or not, they ought all to be laid open from one end to the other.

In general, this ſimple diviſion of the ſinuſes would prove ſufficient; but when any of the parts through which they run, have become uncommonly hard, a ſmall portion of the diſeaſed parts, contiguous to the ſores, ſhould be removed with the ſcalpel. This, however, is not always neceſſary, as the inflammation and conſequent ſuppuration, induced by the mere diviſion of the ſinus, very commonly removes every ſlight degree of calloſity; but when the hardened parts are extenſive, and too conſiderable to be removed in the courſe of the ſubſequent ſuppuration, ſuch a proportion of them ſhould be cut off with the ſcalpel, as might not probably be removed in this manner. This, however, is a point on which nothing deciſive can be ſaid; for the neceſſity of removing a portion of theſe diſeaſed parts, and the quantity to be removed,

moved, muſt, in all ſuch caſes, be left to the judgment of the operator.

After all the ſinuſes have been freely divided, the ſtaff ſhould be withdrawn, and the divided parts gently ſeparated, by the introduction of ſoft lint ſpread with any emollient ointment, in order to prevent their immediate reunion. But although ſome eaſy application ſhould for this purpoſe be inſerted between the lips of the wound, it ought to be done with caution; for ſtuffing or cramming the ſores, as is ſometimes done, always does harm, and often renders all the other ſteps of the operation abortive. The ſores are now to be covered with a pledget of emollient ointment; and proper compreſſes being applied over it, the T bandage ſhould be employed to retain them.

About twenty-four hours after the operation, the outward coverings ſhould be removed, and an emollient poultice applied over the dreſſings; and as ſoon as a free ſuppuration has taken place, the whole ſhould be removed, and light eaſy dreſſings

fings continued till the fores are healed, by a proper adhefion of the parts at the bottom of each.

A very important part of the cure is found to confift in the dreffings being duly applied. Indeed, regular dreffings are of fuch importance, that, without this attention, all the previous fteps of the operation avail nothing. It is chiefly, indeed, by more attention being given to this in private practice, than can eafily be done in hofpitals, that we prove more fuccefsful with private patients in the treatment of fores of this defcription.

I have not yet mentioned the ufe of bougies, nor of the catheter, as a neceffary part of the treatment fubfequent to the operation; and in this I fhall poffibly appear to be fingular; for we are commonly advifed to keep a bougie conftantly inferted from the time of the operation, excepting at the time of voiding urine, when a catheter is advifed to be employed; and in order to avoid the trouble of withdrawing the one, and inferting

ing the other, ſome practitioners adviſe a flexible catheter to be kept in the urethra from the firſt.

The advantages ſuppoſed to accrue from the uſe of bougies here, is the prevention of any undue contraction of the urethra; and by the catheter it is meant to prevent the urine from paſſing off by the ſore during the cure. Theſe motives, for uſing both the one and the other, are plauſible; and they have accordingly been generally adopted. I am free to confeſs, too, that, following the example of others, I have often employed both the catheter and bougie; but I cannot ſay that I ever did ſo with advantage, and I have often ſeen them do much harm. By diſtending the urethra, the ſores do not ſo readily heal; and if the catheter does not paſs fully into the bladder, part of the urine, in coming off, almoſt conſtantly paſſes between it and the urethra, ſo as to get acceſs to the wound, by which it does more harm to the ſore, than if no catheter had been uſed: And, again, if a catheter is paſſed

paſſed entirely into the bladder, and kept long in this ſituation, it almoſt conſtantly does harm, by inducing pain, inflammation, and ſwelling about the neck of the bladder.

But whoever will go freely into a different practice, and will endeavour to cure this kind of ſore without the aid of theſe inſtruments, will ſoon find that they are not neceſſary; and that the wound in the urethra, from the operation that I have deſcribed, is in general more eaſily cured, without the aſſiſtance either of bougies or catheters, than when they are employed; for inſtead of forwarding the cure of the ſore, they uniformly tend to retard it, by tearing open ſuch adheſions as nature, if left to herſelf, would have made altogether complete.

This, I muſt again remark, is a point of much importance, and merits all poſſible attention. The uſe of the bougie, in all ſuch caſes, is at preſent ſo univerſal, that the cure of a fiſtula in perinæo by an operation, is almoſt never attempt-

ed, but where bougies are at the ſame time employed; but, from much experience in this branch, I am now convinced that many more would be cured, if the bougie and catheter were both laid aſide.

In real obſtructions of the urethra, bougies, as I have ſaid, are almoſt the only remedy to be truſted; but they are of no farther uſe after theſe obſtructions are deſtroyed: When, therefore, a fiſtulous opening remains after the obſtructions are removed, or, when no ſtricture or obſtruction exiſts, the operation that I have deſcribed ought alone to be depended on; and in this part of the cure bougies ought never to be employed.

But it is ſaid by thoſe who patroniſe the uſe of the bougie and catheter, that if the urine is allowed to paſs out by the ſore, the cure will be thereby, if not altogether prevented, at leaſt much retarded. To this it may be anſwered, That after the operation of lithotomy, we do not find the cure retarded although the urine comes

comes at all times into immediate contact with, and during the firſt days after the operation paſſes conſtantly off by the wound. In what manner this is effected, I ſhall not at preſent determine; but that the fact is ſo, no practitioner will deny: And from all the experience that I have had, openings in any other part of the urethra, require no more aſſiſtance from bougies or catheters, than they do in that part of it which is divided in lithotomy; and every lithotomiſt, I believe, would ſpurn at the idea of keeping a catheter conſtantly in the bladder after this operation, in order to prevent the urine from paſſing off by the wound.

It happens, indeed, in a few caſes of lithotomy, that a contracted ſtate of the urethra is produced by the cicatrix of the ſore: In this ſituation, after the parts are firmly united, bougies prove ſometimes uſeful by removing the ſtricture; and in particular inſtances, where the ſore does not heal, by the urine continuing to paſs by the wound, in conſequence of ſtrictures or

adheſions in the urethra, the bougie is employed with advantage even during the progreſs of the cure. But theſe are rare occurrences, and no practitioner has ever recourſe to bougies, till ſome degree of obſtruction has actually taken place: In the ſame manner they ſhould never be employed in this operation, till the propriety of uſing them is pointed out by the formation of ſome degree of obſtruction.

When the parts of which the perinæum is formed have become hard and otherwiſe diſeaſed, before any operation ſuch as I have deſcribed is adviſed, we are commonly directed to a long-continued uſe of poultices; mercurial frictions; and the uſe of reſolvent gum plaſters. So far, however, as I have obſerved, little or no advantage is derived from this; for any ſuppuration which it excites, is, in general partial, ſo that it has little effect in removing the hardneſs for which it was employed.

And, again, when the hardened parts are extenſive, and when no relief is obtained

tained from the diſcutient remedies that I have mentioned, we are in general adviſed to cut them entirely away with a ſcalpel. There is no neceſſity, however, for this meaſure; for although it may be proper to remove the edges of the ſores when they have become callous, there is never any good cauſe for extirpating all the diſeaſed parts: It would frequently be a painful and cruel operation; and as it could ſeldom be of any real advantage, it ought rarely, or never to be practiſed.

When, again, a preternatural opening is formed in the urethra, either by external violence or the abraſion of its ſubſtance by abſceſſes ſeated in it, a different courſe of treatment becomes neceſſary. When produced by an abſceſs in the perinæum, or in any part of the urethra, a free diſcharge ſhould be given to the matter; every part of the cellular ſubſtance in which it is found to lodge ſhould be laid open; and warm fomentations and poultices ſhould be applied to ſuch inflammatory tumors as have not ſuppura-

ted.—In this manner, ſores, which if neglected, would prove highly diſtreſsful, are often made to heal eaſily; but when even by theſe means the ſores do not unite, and continue to diſcharge matter, and eſpecially when their edges become hard and callous, the ſinuſes muſt be laid open, and every other part of the cure conducted in the manner that I have already adviſed.

This kind of ſore when produced by wounds of the urethra, requires a ſimilar method of cure.—By the removal f extraneous matter, and by the uſe of poultices to abate inflammation, a cure will often be accompliſhed without any other aſſiſtance; but, when the ſtate of the ſores requires it, they ought to be laid open, and treated in every reſpect like other caſes of fiſtula.

The moſt diſtreſsful variety of this kind of ſore, is that in which the urine paſſes off directly from the body of the bladder without communicating with the urethra. This variety of the diſeaſe, I may remark,

is

is readily diſtinguiſhed from the other by the urine drilling off inſenſibly and at all times; whereas, when the external opening does not communicate directly with the bladder, and when the urine paſſes firſt through part of the urethra, the patient has commonly the power of retention in full perfection; by which his ſituation is much more comfortable than when the urine is conſtantly paſſing off.—But although this variety of the diſeaſe is eaſily diſtinguiſhed from the other, it is not ſo readily cured; for the ſinuſes from whence the urine is diſcharged communicate directly with the bladder, and nothing tends to remove them but laying them open to the bottom.

When, therefore, a patient diſtreſſed with this kind of ſore, finds his ſituation to be ſuch as to make the pain and riſk of ſuch an operation an eligible alternative, it ought certainly to be adviſed, as the only means from which any relief is ever likely to be derived.

As the intention and principle of this operation are the ſame as of that in which the urethra only is concerned, all that need be ſaid in regard to the mode of performing it is, that a ſtaff ſhould be introduced into the bladder; the different ſinuſes ſhould be laid freely open to the bottom; their edges, if callous, ſhould be removed to ſuch a depth as can be done with ſafety, and the wounds thus produced ſhould be lightly dreſſed, in the manner I have already pointed out.

In this manner, a great proportion of this variety of ſore may be cured, provided the means are employed in due time, and duly perſiſted in: But in long-continued fiſtulous ſores of theſe parts, where the ſurrounding cellular membrane has become much hardened, and otherwiſe diſeaſed; and eſpecially, when the ſyſtem is tainted with ſcurvy, ſcrofula, or lues venerea; it muſt be acknowledged that no means with which we are acquainted will prove at all times ſucceſsful.

CHAP.

CHAPTER XXXIV.

Of Hæmorrhoids, *or* Piles.

THE term Hæmorrhoids or Piles was at one time applied to every evacuation of blood from the veins running upon and in the neighbourhood of the rectum; but a mere diſtention of theſe veins, when productive of pain, now receives the ſame denomination.

As long as the diſeaſed parts of the veins remain diſtended, and do not diſcharge any part of their contents, the piles are named Cæcæ or Blind; but when they burſt and diſcharge blood, they are termed Apert or Open.

It

It frequently happens, that a diſcharge of blood upon going to ſtool is the firſt warning or appearance of this diſeaſe: For although in ſome inſtances it is otherwiſe, yet when the parts of the veins chiefly affected lie high in the rectum, the pain or uneaſineſs which they excite is for the moſt part inconſiderable, owing to the veins in this ſituation being ſurrounded with parts which from their ſoftneſs readily yield to their diſtention; whereas, when the diſeaſe occurs at the end of the gut, as the inteſtine is here ſurrounded with a firm muſcular covering, the ſphincter ani, a good deal of reſiſtance is thereby given to the formation of hæmorrhoidal tumors, and they accordingly in this ſituation almoſt always excite a great deal of diſtreſs.

When piles are ſo ſituated as to be within view, if they have begun to diſcharge blood, one or more ſmall openings are obſerved, from whence the blood is poured out: When the parts have not been previouſly much diſtended, theſe openings appear

pear to be the mouths or outlets of veins; and the openings from whence the blood proceeds, are each of them obſerved to be ſeated upon a ſmall protuberance ariſing from the internal coat of the gut. In general, theſe tumors, when they diſcharge freely, are ſmall, being ſeldom larger than an ordinary pea; but when any obſtruction occurs to the diſcharge of their contents, they gradually increaſe, till in ſome inſtances they arrive at the ſize of pigeons or pullets eggs, when by the pain, irritation, and teneſmus, which in ſuch a ſtate they always excite, much diſtreſs and miſery are produced by them. Even when the tumors at laſt burſt and diſcharge their contents, if they have previouſly become large, they do not diſappear entirely: On the contrary, they ſtill continue of nearly the ſame ſize; they aſſume a livid appearance; and inſtead of being ſoft or elaſtic, they are firm and of a fleſhy conſiſtence.'

As long, however, as hæmorrhoidal tumors remain ſhut, they are ſoft and yielding to the touch, inſomuch that by preſ-

ſure

ſure they can commonly be much diminiſhed; their colour is ſtill more livid than that of the apert kind, and they are commonly more painful: For although they do not uſually become large before burſting; yet when they lie deep, and are thickly covered with firm unyielding parts, the tumors are in ſome inſtances of ſuch a ſize, as almoſt entirely to obſtruct the paſſage of the fæces; and as a teneſmus is a common ſymptom in this ſtate of piles, the diſtreſs produced by the frequent inclination to go to ſtool, together with the difficulty of the evacuation, never fail to induce a great deal of miſery.

Theſe tumors have commonly been ſuppoſed to proceed from a mere dilatation of the hæmorrhoidal veins. In the incipient ſtate of the diſeaſe, while they remain ſmall and circumſcribed, this may frequently be the caſe; but whenever they become large, they will almoſt conſtantly be found to be connected with an effuſion of blood into the contiguous cellular ſubſtance.

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As long as piles remain ſmall, ſoft, and compreſſible, we may conclude, that the blood ſtill remains within the cavities of the veins; but whenever they become large, and of a firm fleſhy conſiſtence, the blood, as I have juſt obſerved, will, in almoſt every inſtance, be found effuſed into the neighbouring parts.

Various conjectures have taken place on the nature of the hæmorrhoidal diſcharge: But the moſt prevailing opinion is, that it is commonly of a critical nature; that it is induced by the preſence of ſome peccant or morbific matter in the ſyſtem; and that therefore it would, in general, be improper to put a ſtop to it.

It does not, however, require minute inveſtigation to ſhew, that this reaſoning is ill-founded: For were we even to allow, that the piles commonly appear without the intervention of any evident occaſional cauſe, and that they are in reality connected with ſome morbific humour in the blood, in what manner can we ſuppoſe this diſeaſed matter to be ſeparated and diſcharged

diſcharged by the hæmorrhoidal flux? Now that the circulation of the blood is well underſtood, it will be difficult for the ſupporters of this opinion to give a ſatisfactory anſwer to this queſtion. But, independent of this, we know that piles are very commonly induced, perhaps in nineteen caſes of twenty, by an obvious cauſe; and that the removal or prevention of this, when effected in due time, almoſt conſtantly prevents or cures the diſeaſe. In a great proportion of caſes, piles will be found to proceed from compreſſion upon the hæmorrhoidal veins; by which the blood contained in them being impeded in its progreſs to the heart, dilatations of theſe veins, and ſubſequent effuſions, are conſequences that neceſſarily enſue.

The moſt frequent cauſes of this compreſſion are, large collections of hard fæces in the rectum; the preſſure produced upon the neighbouring parts, in pregnancy, by the gravid uterus; and laſtly, tumors, of whatever nature they may be, which,

which, from their ſituation, compreſs the hæmorrhoidal veins.—Thus piles are not an unfrequent effect of ſchirrous tumors in the rectum, and of ſimilar affections of the proſtate gland and bladder; and I have ſometimes traced them as the conſequence of ſwellings in the meſenteric glands, which alſo act by obſtructing the refluent veſſels in their courſe from the rectum.

When tumors in the contiguous parts are found to produce the diſeaſe, the means of cure muſt be directed particularly to the removal of theſe. When pregnancy is the cauſe, gentle laxatives, and a frequent recumbent poſture will often afford relief; but nothing will remove the diſeaſe till delivery takes place. And, again, when piles have been induced by coſtiveneſs, a regular uſe of gentle aperients, ſuch as cream of tartar and oil of caſtor, will very commonly procure relief. But when the parts inflame and become painful, ſuch remedies muſt be employed as are known to be moſt powerful in removing, or even preventing the effects which theſe ſymptoms

toms uſually induce. If much fever prevails, blood ſhould be diſcharged in proportion to the ſtrength of the patient; and it anſwers beſt when taken by means of leeches applied as near as poſſible to the ſeat of the pain: Nay, I often apply them upon one or more of the hæmorrhoidal tumors, and very commonly with much advantage: The pained parts ſhould be frequently bathed with a mild ſolution of ſaccharum ſaturni; and the patient ſhould be kept upon a low, cooling regimen.

I here think it proper to mention two remedies that I have often uſed with advantage in caſes of piles. The one is an ointment compoſed of equal parts of oak-galls finely powdered, and hogs-lard or butter: This commonly gives more relief in external hæmorrhoidal ſwellings, than any of the ſulphur ointments ſo frequently employed; and when the ſeat of the pain is internal, and cannot be reached by an ointment, injections of a ſtrong infuſion of galls may be uſed inſtead of it. The other is a remedy that I firſt employed on the ſuggeſtion

ſuggeſtion of our late juſtly celebrated Profeſſor Dr Cullen; balſamum copaibæ. This medicine, given to the extent of fifty, ſixty, or eighty drops, morning and evening, not only removes the pain ſo frequently produced by piles, but very commonly anſwers as an eaſy and certain laxative.

Warm emollient fomentations and poultices ſometimes give relief in piles, but as they tend, when long continued, to excite relaxation in the contiguous parts, by which very large deſcents of the gut are produced, they ſhould in every inſtance be ſoon laid aſide.

By the uſe of one or other of theſe remedies, all the ordinary ſymptoms of piles will in general be removed: But there are ſome ſtates of the diſeaſe that can only be relieved by a chirurgical operation; and theſe particularly are, frequent returns of profuſe evacuations of blood from the hæmorrhoidal veſſels, and the piles becoming ſo large as to induce much pain, irritation, and even obſtruction in the under part of the rectum.

When frequent returns of hæmorrhagy have weakened the ſyſtem too much; and when bloodletting, gentle aperients, and a proper regimen, do not prove effectual, our next reſource is to put a ſtop to the diſcharge by the direct application of preſſure to the mouths of the bleeding veſſels. In ſlight caſes of piles, this may frequently be done by a tube of ſilver wrapped properly round with ſoft linen, being paſſed into the rectum; or a piece of ſheep's gut, tied at one extremity, being puſhed into the anus, and a quantity of water or any other fluid being conveyed into the open end of it, which ought to be of a length to admit of two or three inches hanging out at the rectum, almoſt any neceſſary preſſure may thus be applied, merely by puſhing the water into the upper part of the gut, and ſecuring it there with a ligature *.

In

* Mr Bromfield, when treating of the extraction of the ſtone in women, adviſes the urethra to be dilated by means of water contained in the gut of a fowl. In juſtice to Mr Bromfield, I muſt obſerve, that the practice here recommended is taken from this hint.

In various caſes I have proved ſucceſsful with this remedy, where others have failed, and in ſome inſtances I have derived advantage from cold aſtringent infuſions and ſolutions being thrown into the rectum, ſuch as infuſions of red-roſe leaves, walnut-tree leaves, and oak bark, and ſolutions of alum, and even of ſaccharum ſaturni, and white vitriol. When theſe remedies do not ſucceed, there is often reaſon to think, either that the veſſels from whence the blood is diſcharged lie too high in the abdomen to admit of their being acted upon in this manner, or if near the end of the gut, that they are of a conſiderable ſize: In the one caſe, we truſt entirely to perſeverance in the means that have already been mentioned; particularly to the effect of a low regimen, gentle aperients, and the internal uſe of alum, kino, and other aſtringents; while, in the other, if the bleeding veſſel can poſſibly be perceived, it ought at once to be ſecured with a ligature. To thoſe who are not accuſtomed to the application of

this remedy, it may appear to be of a hazardous nature, but when properly applied, I can, from much experience of the effects of it, venture to ſay, that it never does harm, while it ſeldom fails to act with certainty in the cure. The ligatures may be applied either with the crooked needle or tenaculum; but the latter ſhould perhaps in every inſtance be preferred, as with it the ruptured veſſels alone can be tied without including any of the contiguous parts, which cannot be done when we employ the crooked needle.

I have already obſerved, that, in ſome inſtances, the tumors produced by piles become very large. As long, however, as they are not painful, or very inconvenient, they ought not to be touched; but whenever they become ſo large as to obſtruct the paſſage of the fæces, they ought if poſſible to be removed: When ſituated near to the verge of the anus, this may commonly be eaſily done; and even when an inch or more up the rectum, they may frequently be brought completely in view by

by preſſure, ſimilar to what is employed on going to ſtool.

Various methods have been in uſe for removing theſe tumors, namely ligatures, exciſion, and even the potential and actual cauteries. Neither of the latter, however, ſhould be ever employed; ſo that the methods by ligature and exciſion are thoſe that we have to conſider.

When a hæmorrhoidal tumor is attached by a ſmall root, and when therefore a ligature is eaſily applied, we are commonly adviſed to take it off in this manner; and on the contrary, when it adheres to the gut by an extenſive ſurface, we are deſired to diſſect it off with a ſcalpel. The very reverſe, however, ſhould be adopted; for when the tumors are ſmall, and attached by narrow necks, and when there is therefore no reaſon to be afraid of any hæmorrhagy that may enſue from removing them by exciſion, as the ſcalpel may in this caſe be uſed with ſafety, it ought undoubtedly to be preferred, as the eaſieſt and ſpeedieſt method of

finiſhing the operation; but whenever they are large, and when there is reaſon therefore to ſuſpect that the arteries that ſupply them with blood are large, the ligature ought certainly to be employed, as the only ſafe means of removing them. No good reaſon has ever been given for confining the uſe of the ligature to tumors with ſmall necks; for although in theſe it is more eaſily applied, yet with due care and attention, even ſuch as have broad extenſive attachments may be removed in this manner.

A needle armed with two firm waxed ligatures being introduced through the middle of the tumor at its baſe, and the ends of one of them being firmly tied round one half of the tumor, whilſt the other half of it is ſecured by the other ligature, the whole may in this manner be removed with as much certainty as when the baſe is narrow. If the ligatures have been properly applied, the tumor will commonly fall off in the ſpace of three days: In ſome inſtances, they drop

drop off in forty-eight hours, or even in leſs; but in general three days are required. When the ſcalpel is employed for the removal of theſe tumors, the parts ſhould be afterwards dreſſed with ſoft lint, covered with any emollient ointment; but when taken off with ligatures, no dreſſing is neceſſary.

In the uſe of ligatures for this purpoſe, when more than one is contained in the ſame needle, their being of different colours tends to prevent confuſion.

CHAPTER XXXV.

Of Condylomatous Excrescences, *and ſimilar Affections about the* Anus.

THE parts about the anus are liable to excreſcences, termed Condylomata, Fici, and Criſtæ. The diſtinctions, however, which theſe names import, are of no moment; for theſe tumors are all of the ſame nature, and are cured by the ſame means.

We ſometimes meet with them in the cavity of the gut itſelf; but moſt frequently they are confined to the parts exterior to the ſphincter. They are of different degrees of hardneſs, being in ſome inſtances not much firmer than the parts

parts with which they are connected, and in others they reſemble the firmeſt ſchirrus. Their colour is alſo very various: In ſome they are of a pale white, and in others of different ſhades of red. In ſome inſtances, a ſingle excreſcence or two is only met with; but in others they cover almoſt the whole parts contiguous to the anus. In ſome, they never become larger than ordinary warts; and the diſeaſe, even in its moſt advanced ſtage, is found to conſiſt of a number of theſe, either adhering together, or lying in cloſe contact. But in others, the tumors are from the beginning broad and flat, being frequently of the ſhape and magnitude of ſplit garden-beans.

Theſe excreſcences, on their firſt formation, ſeem all to be productions of the cuticle; but when of long duration, they commonly adhere to the ſkin itſelf, and in ſome inſtances even proceed to the depth of the contiguous muſcles.

As long as they create no uneaſineſs, they ſhould never be touched; and it frequently happens that they never become

ſo

ſo large as to require much attention; while in ſome they excite ſo much diſtreſs, that we are obliged to remove them immediately.

In ſuch as are ſoft, rubbing them from time to time with crude ſal ammoniac, or waſhing them with a ſtrong ſolution of that ſalt, or with ſpirit of hartſhorn, will frequently remove them. The pulvis ſabinæ, too, in fine powder, often anſwers the purpoſe, as well as red precipitate of mercury, particularly when mixed with equal parts or thereby of calcined alum; but all of theſe remedies are ſlow in their operation; and when the tumors are hard and warty, they have little or no effect. When they do not, therefore, ſucceed, we employ either the ſcalpel or lunar cauſtic: But when the patient will ſubmit to the ſcalpel, it ought always to be preferred; for no danger can ariſe from it, as the parts to be removed are not ſupplied with large bloodveſſels. All the diſeaſed parts ſhould be completely removed; and dry lint being applied to the ſores, they fall afterwards

terwards to be dreſſed like wounds produced in any other way.

When the fears of a patient, however, prevent him from ſubmitting to this operation, cauſtic muſt neceſſarily be employed: But in the uſe of this remedy, much attention is neceſſary, to prevent it from ſpreading to the gut; for miſchief might enſue were it to be directly applied to it.

CHAP-

CHAPTER XXXVI.

Of a Prolapsus Ani.

A Protrusion of any part of the rectum beyond its uſual limits, is termed a Prolapſus Ani. In ſome inſtances, the diſplaced portion of gut is inconſiderable, but in others it falls down to a great length.

The ſphincter ani and neighbouring parts, whilſt in full ſtrength, ſerve as a baſe or ſupport to the ſuperior part of the gut: Whatever, therefore, tends to induce any morbid debility of theſe, will neceſſarily have ſome influence in the formation of a prolapſus ani.

The

The moſt common cauſe, however, of this protruſion of the gut is, frequent and violent exertions excited in the rectum itſelf by ſome irritating cauſe about its extremity; thus producing what we commonly term teneſmus: A frequent uſe of aloëtics is ſaid to be very apt to excite irritation in the rectum, although, from much obſervation, I am now inclined to doubt of the truth of it; but I have much reaſon to think, that the ſmall worms termed Aſcarides, by lodging chiefly in the under part of the rectum, and by thus producing irritation, have, in different inſtances, induced deſcents of the gut. Habitual coſtiveneſs, hæmorrhoidal ſwellings, and in ſhort every cauſe that ſtimulates the rectum to over-exertion, will alſo be apt to produce it.

The rectum often remains unreduced for a great length of time, and no bad conſequences enſue: Hence it is evident, that this portion of gut will bear more expoſure to the air than the other parts of the inteſtines; but we ought not from this

to

to be ever induced to allow any part of it to remain long down, without attempting to reduce it. By many, we are deſired, before reducing the gut, to foment it well with emollient and antiſeptic decoctions; and the operator is directed to cover his fingers with oiled or waxed linen before any preſſure is applied to it. Theſe previous ſteps, however, are not neceſſary. We ſhould inſtantly indeed endeavour to return the prolapſed parts, without allowing them to be expoſed to ſuch injuries as might enſue from the delay in fomenting them; and as we can handle the parts with more exactneſs when the fingers are bare, than when covered with oiled or waxed gloves, theſe ought never to be employed; but when any covering is judged to be neceſſary, a piece of ſoft oiled cotton cloth anſwers the purpoſe better than any other.

The patient being put into bed, and laid upon one ſide, or upon his face, which anſwers better, with his buttocks elevated above the reſt of his body, the ſurgeon

geon ſhould now preſs firmly, though equally, with the palm of his hand upon the under part of the protruded gut. By a continuance of this kind of preſſure, the gut is in general eaſily reduced; but when this does not ſucceed, we ſeldom fail by puſhing up the ſuperior part of the gut with the fingers, while the palm of the other is made to ſupport the inferior part of it. When, indeed, the prolapſed portion of gut has previouſly become much inflamed and ſwelled, no means of reduction will ſucceed till theſe are removed. In this ſituation, therefore, before preſſure is employed, it may be proper to diſcharge a quantity of blood in proportion to the ſtrength of the patient, particularly with leeches, from the neighbourhood of the anus; the gut ſhould be fomented with a weak ſolution of ſaccharum ſaturni, moderately warm; and when, by theſe means, the ſwelling is nearly, or perhaps entirely removed, the prolapſed parts will be eaſily reduced in the manner I have already adviſed.

We

We ſeldom, indeed, find it difficult to reduce protruſions of the rectum; but it is often no eaſy matter to retain them after they are replaced: For the ſphincter ani, by repeated deſcents of the gut, often becomes ſo relaxed that it does not retain it; ſo that a protruſion takes place, not only on going to ſtool, but often on every attempt to walk, or to ſit in an erect poſture.

When the gut thus falls readily down, much benefit may be derived from a proper bandage. On the protruded portion of gut being replaced, if a thick compreſs of linen is applied directly upon the anus, a proper application of the T bandage over the whole proves often uſeful. But in Plate LXXVIII. fig. 3. I have delineated a truſs originally invented for this purpoſe by the late Mr Gooch *, by which the parts may be more completely retained than with any other bandage, while at the ſame time the patient may be allowed more

* Vid Caſes and Practical Remarks in Surgery, &c. Vol. II. by Benjamin Gooch.

more freedom than he could otherwiſe poſſibly venture on.

The parts that protrude upon going to ſtool being immediately replaced, an operation that the patient himſelf can often accompliſh, this truſs ſhould be directly applied; and with a view to ſtrengthen the ſphincter ani and neighbouring parts, the debility of which is often to be conſidered as the ſole cauſe of the deſcent, the patient ſhould be adviſed to the uſe of ſteel, bark, cold bathing, and daſhing cold water upon the buttocks and under part of the back: Conſiderable advantage has alſo been experienced, from a frequent uſe of aſtringent injections, particularly infuſions of galls and oak-bark; and when a ſmall proportion of opium is added to the liquor, the irritability in the rectum, which is often to be conſidered as the original cauſe of the diſeaſe, is thereby more effectually removed than in any other way. I have ſometimes ventured to add a ſmall quantity of alum, and ſaccharum ſaturni, to theſe injections; but in general, any ad-

dition of a ſaline nature is here inadmiſſible, from the irritation that ſuch remedies commonly give to the gut.

By one or other of theſe means, the diſeaſe may either be entirely cured, or at leaſt ſo far palliated as to obviate every inconvenience from its continuance.

CHAP-

CHAPTER XXXVII.

Of an IMPERFORATED ANUS.

AN imperforated anus is not an uncommon occurrence, ſo that every midwife ſhould examine with attention the ſtate of this and other natural paſſages immediately after birth.

In ſome, the end of the rectum is ſomewhat prominent where the anus ought to be, being only covered with ſkin and a ſmall quantity of cellular membrane: But in others, no veſtige of the rectum is perceived; and the ſkin retains its natural appearance, without being anywhere elevated between the ſcrotum and point of the coccyx.

In ſome, the rectum terminates within an inch of the ordinary ſeat of the anus; in others, it has reached no farther than the top of the ſacrum. It ſome it has been known to terminate in the bladder; and in others, in the vagina.

When the aſſiſtance of a ſurgeon is required, as death muſt enſue if a proper vent be not obtained for the fæces, no time ſhould be loſt in deliberation. If the end of the gut is found to be covered with ſkin only, and if a protuberance is formed by the fæces puſhing it forward, all that the ſurgeon can do, is with a ſcalpel or lancet to make an opening of a ſufficient ſize; but when this kind of direction is not met with, more difficulty and danger is to be dreaded.

When the gut is deep, an inciſion of an inch in length ſhould be made directly on the ſpot where the anus ought to be; and this ſhould be continued with gradual and repeated ſtrokes of the ſcalpel, in the direction that the rectum ought to take; not in a direct courſe through the axis of the

the pelvis; for in that direction the vagina or bladder, or perhaps both, might be injured; but backwards along the coccyx, where the riſk of wounding any part of importance is leſs. The beſt director is the finger of the operator. The fore-finger of one hand being inſerted into the wound, and paſſed towards the coccyx, the ſurgeon, with the ſcalpel in the other, ſhould diſſect gradually in this direction, either till he meets with fæces, or till the ſcalpel has reached at leaſt the full length of his finger; and if, after all, the fæces are not reached, as death muſt enſue if more be not attempted, I would adviſe a long trocar to be puſhed forward upon the finger, in ſuch a direction as the operator thinks will moſt probably meet with the gut.

In this manner many lives have been ſaved which would otherwiſe have been loſt. I myſelf have had two ſuch caſes; in both of which the gut lay deep, and in both I was fortunate enough to form an anus, which for many years has continued to anſwer the purpoſe ſufficiently.

But in both it was exceedingly difficult to preſerve the paſſage ſufficiently wide: For as ſoon as the doſſils of lint and other tents employed for preſerving the paſſage were withdrawn, a very ſtrong contraction took place, by which the opening was occaſionally nearly obliterated. Sponge tent, gentian root, and other ſubſtances that ſwell by moiſture, were at different times employed; but theſe uniformly gave ſo much pain and irritation, that they could not be continued. They are commonly, indeed, recommended in ſuch caſes; but all who have ever employed them in parts ſo exquiſitely ſenſible as the rectum, will ſoon be convinced of the impropriety of the advice.

Doſſils of ſoft lint moiſtened in oil, and rolls of bougie plaſter of a proper ſize, were found to irritate leſs, and to anſwer better than any other application; and for the purpoſe of dilating the paſſage, when, at different times during the cure, it was found to have become too ſtrait, the method I have already adviſed (when

ſpeaking

ſpeaking of piles) of compreſſing blood-veſſels in the rectum by introducing a ſheep's gut, ſhut at one end, into it, and forcing water up by the other, was employed with advantage. But upon the whole, although this part of the cure may appear to thoſe who have not met with ſuch caſes, to be ſimple and eaſy, it is found to be much otherwiſe in practice. Indeed, no caſe in which I was ever concerned, gave ſo much perplexity and trouble, either to the patient or myſelf, as each of thoſe I have mentioned; for although in both, the openings were at firſt made ſufficiently large, yet nothing but continued attention for the ſpace of eight or ten months, prevented the neceſſity of a frequent repetition of the operation. When the ſkin alone is to be cut, it is a ſimple matter indeed; for in this caſe nothing is in general neceſſary but the introduction of a doſſil of ſoft lint for a few days into the opening. But when the rectum lies deep, I am inclined to think, from the event of thoſe caſes, that although ulti-

mately, a complete cure may commonly be obtained after a free diſcharge of fæces is procured, that much care and attention on the part of the operator will always be required for a conſiderable time after the operation; and in general we may ſuppoſe, that the difficulty will be in proportion to the depth of the cut.

Even where the gut terminates in the bladder or vagina, the operation ſhould be adviſed: For, as in the one caſe, all the fæces muſt be emptied into the bladder, there would be much riſk of ſuch accumulations being formed in it as would ſoon put a total ſtop to the diſcharge by the urethra; and in the latter, where the rectum terminates in the vagina, much diſtreſs would enſue from it, which a ſucceſsful iſſue of this operation alone could prevent.

When it unfortunately happens that no paſſage is obtained for the fæces by any of the means that I have mentioned, might not we attempt an opening above the pubes, with the view of reaching the under

der extremity of the colon, or perhaps on the right ſide, ſo as to reach the caput coli, for the purpoſe of making an artificial anus? It is true, that the chance of ſucceſs from ſuch a meaſure would not be great; and, even admitting that the attempt ſhould ſucceed in the moſt complete manner, the diſcharge of fæces from the opening would always prove troubleſome and very uncomfortable; but the melancholly idea of leaving a child in ſuch a ſtate, to die in much pain, muſt prove ſo highly diſtreſsful, both to the parents and operator, as would incline me rather to adviſe even the doubtful and deſperate remedy I have mentioned.

CHAP-

CHAPTER XXXVIII.

Of the FISTULA *in* ANI.

EVERY ſinuous ulcer in the neighbourhood of the rectum is termed a Fiſtula in Ano. This is the moſt accurate and moſt ſimple idea that can be given of the diſeaſe: For although, in different inſtances it aſſumes a variety of appearances, and although the deſcriptions given of theſe have tended to render this part of chirurgical pathology extremely perplexed, yet whoever will attentively conſider all the circumſtances that relate to it, will find, that the fiſtula in ano is of a nature as determined and fixed as any

any diſeaſe that falls within the province of Surgery.

Several varieties of this ulcer are deſcribed by authors: An external opening contiguous to the anus, communicating with an internal ulcer, but without any connection with the rectum, is termed an Incomplete Fiſtula: When the ulcer has two outlets, one external, and the other opening into the gut, the fiſtula is ſaid to be complete; and again, when it communicates with the gut only, without any external opening, it is termed an Internal or Occult Fiſtula.

This diſeaſe has been likewiſe diſtinguiſhed into Simple and Compound. When the parts through which the ſinus runs are hard and tumefied, or when a communication is diſcovered between the ulcer and the bladder, vagina, os ſacrum, and other contiguous parts, the fiſtula is ſaid to be of a complicated or compound nature; and it is termed a Simple Fiſtula, when all the neighbouring parts are ſound.

In

In the commencement of the diſeaſe, the contiguous parts are very commonly ſound; but whenever the ulcer has been of long duration, not only the parts about the anus, but even the perinæum and buttocks, frequently become diſeaſed. This may depend on different cauſes, but it appears moſt frequently to proceed from the matter of the abſceſs or ſinus not finding a proper vent, and from its being allowed therefore to ſpread along the contiguous cellular ſubſtance.

Thus, we ſometimes find, that the perinæum and part of the buttocks have become hard, with various ſinuſes running in different parts of them; and when the matter is ſharp and acrid, inſtances occur of the os ſacrum becoming carious, and of the bladder and vagina being corroded ſo as to have the contents of the rectum emptied into them. This laſt ſtage of the diſeaſe is not, however, often met with; and it would probably never occur, if the diſeaſe were properly managed from the beginning,

beginning, by a free diſcharge being given to the matter.

In enumerating the cauſes of this diſeaſe, it may be remarked, that whatever tends to produce matter about the anus, may be conſidered in this light. Thus the piles, condylomatous tumors in the neighbourhood of the rectum, hardened fæces collected in the extremity of the gut, and, in ſhort, whatever can excite irritation and inflammation of theſe parts, will occaſionally terminate in ſuppuration; and, if the matter thus produced be not abſorbed, or if the ſore ariſing from the burſting of the abſceſs, does not ſoon heal, a ſinuous ulcer will very readily form. I may alſo remark, that abſceſſes in theſe parts frequently ſucceed to fevers and other diſeaſes of the conſtitution.

The circulation being more languid here than in other parts, every inflammatory tumor that forms in it is not only more apt to ſuppurate, but the ſores that enſue heal with difficulty. They always excite much diſtreſs, and require much caution and attention,

tention in the treatment. We have it commonly in our power, however, with proper management from the firſt appearance of inflammation about the anus, to prevent much of that pain and miſery, that theſe tumors, when neglected, are ultimately ſure to induce.

As ſoon as this kind of tumor has advanced ſo far as to make it probable that ſuppuration will enſue, every means that can accelerate the formation of matter ſhould be adviſed: And as nothing anſwers this purpoſe with more certainty than a continued application of heat, warm emollient poultices, fomentations, and the ſteams of warm water, are chiefly to be truſted. By a due application of theſe remedies, the tumor may in general be made to ſuppurate quickly; and as ſoon as matter is formed, it ought to be diſcharged by a free inciſion in the moſt depending part of it.

In this ſtage of the diſeaſe, much more depends upon the abſceſs being freely and timouſly laid open, than is commonly imagined;

imagined; for if this is long delayed, or if the opening is not made of a ſize ſufficient for diſcharging all the matter, it is thus allowed to paſs into the contiguous cellular ſubſtance, ſo as to ſeparate, not only the ſkin, but all the under part of the rectum, from the muſcles and other parts with which they naturally lie in contact: And in this manner, inſtead of a ſimple ſore, which, when the abſceſs is rightly treated, is all that we ought to meet with, the whole under-part of the gut is in ſome inſtances entirely ſeparated from the ſurrounding parts, and a variety of ſinuſes form in different directions, either along the perinæum, or by the ſide of the gut, and in ſome inſtances among the muſcles of the hips.

With a view, therefore, to prevent theſe diſtreſsful conſequences, as ſoon as an abſceſs in this ſituation is found to contain matter, it ought, as I have obſerved already, to be opened by a free inciſion; by which means, and with due attention to the ſubſequent treatment of the ſore, if the conſtitution

conſtitution is otherwiſe found, a ſpeedy cure may in general be expected.

The matter being diſcharged, doſſils of lint are commonly crammed into the ſore, with a view to prevent, as it is ſaid, the parts which have been newly divided from adhering too ſoon. This, however, is a very erroneous practice: For extraneous ſubſtances of every kind, by the irritation that they give to the rectum, almoſt always do miſchief; and, if the opening is of a ſufficient ſize, there is no neceſſity for this precaution, as the conſtant diſcharge of matter from the ſore, proves in general ſufficient for preſerving it of a ſize adequate to the quantity produced; and this I may remark is the principal object we have in view from the operation.

Inſtead of irritating the parts, therefore, by the introduction of doſſils, as ſoon as the matter of the abſceſs has been freely diſcharged, the ſore ſhould be merely covered with ſoft lint ſpread with any mild ointment, and an emollient poultice applied over the whole.

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Any hardneſs that did not diſappear during the ſuppuration, will thus be ſoon removed, and a cure will in general be quickly obtained.

It moſt frequently, however, happens, that the aid of ſurgery is not deſired in this firſt and very ſimple ſtate of the diſeaſe; nor till the abſceſs has burſt of itſelf, and perhaps at an improper part; and till of courſe much miſchief is produced, by the matter having inſinuated into the ſurrounding cellular ſubſtance: In this ſituation, one or more ſinuſes are commonly met with, forming, according to their duration, different degrees or ſtages of the real fiſtula in ano.

When, in this ſtate of the diſeaſe, the advice of a practitioner is deſired, the firſt object he ſhould have in view, is to diſcover with accuracy the courſe of the ſinuſes; for nothing can with propriety be done till this is accompliſhed. When the ſinuſes diſcharge their contents by external openings, the direction in which they run is for the moſt part eaſily diſcovered: If

they run along the perinæum, or ſpread among the muſcles of the hips, a probe, introduced in the uſual manner, will readily paſs along the whole of them: But when any of the ſinuſes follow the direction of the gut, the fore-finger of one hand, after being well oiled, ſhould be introduced into the rectum, at the ſame time that the probe is entered at the wound with the other: By this means we not only prevent the gut from being much injured by the probe, but if any communication has taken place between the gut and the ſinus, it is in this manner eaſily diſcovered, by the point of the probe paſſing from the ſinus, and being found in the gut with the finger. In a few caſes, however, even when we know that the ſinus communicates with the gut, the probe does not paſs eaſily from one to the other; but with due perſeverance we always ſucceed; and if the probe is rightly managed, it may always be done without riſk of hurting the gut.

As our knowing with certainty, whether the ſinus communicates with the gut or not,

not, is of much importance in the cure, nothing ſhould be omitted that may enable us to determine the point with preciſion. When air or fæces are diſcharged by the ſinus, or when water or any other fluid injected into it is returned by the anus, the exiſtence of ſuch a communication cannot be queſtioned.

The abſence, however, of theſe teſts, does not imply that no communication takes place between the gut and the ſinus: For we know that the paſſage of fæces from the rectum into ſores of this deſcription, does not always happen; and we may eaſily ſuppoſe it poſſible for an opening between the ſinus and the gut, to be ſo formed as to prevent the paſſage of liquids from one to the other.

When, by a repetition of cautious trials with the probe, or with injections of warm water into the ſores, the courſe of the different ſinuſes is diſcovered, the method of cure is next to be determined. In a preceding part of this work, the method of

curing ſinuſes has been pointed out *: But from the nature and ſituation of the parts in which this variety of the diſeaſe is ſeated, ſome peculiarities occur in regard to the cure.

Aſtringent injections, paſtes and ointments of the ſame nature, have at different times been recommended for putting a ſtop to the diſcharge of theſe ſinuſes. But the cauſtic property of theſe remedies is by no means ſuited to the irritability of the parts in which this diſeaſe is ſeated; nor have they by experience been found to anſwer the intention for which they were propoſed: They have now, therefore, very univerſally fallen into diſcredit.

I have elſewhere ſhown, that the leading object to be kept in view in the treatment of ſinuſes, is the deſtruction or annihilation of the cavities from whence the matter is diſcharged. With a view to this, different means have been adviſed. Where preſſure can be employed, the ſides of

* Vide Chapter V. Section V.

of ſinuſes are, in ſome inſtances, made to adhere by means of it; but in the fiſtula in ano, this method of cure is inadmiſſible, as in this ſituation no regular or equal preſſure can be applied.

This being the caſe, and knowing that adheſion readily takes place between contiguous parts in a ſtate of inflammation, we endeavour to make thoſe parts inflame that we wiſh to adhere to each other. It is perhaps indeed a doubtful point, whether animal ſubſtances can be made to adhere permanently by any other means than through the intervention of inflammation.

For the purpoſe of exciting this inflammatory or adheſive ſtate of a ſinus, ſo neceſſary for the reunion of its ſides, different means may be employed. It may be accompliſhed either by the introduction of a cord of cotton or ſilk along the courſe of the ſore, or by laying the ſinus open through its whole length, ſo as to convert it as nearly as poſſible into the ſtate of a recent wound.

In other parts of the body, I have adviſed the uſe of a cord, or ſeton as it is termed, in preference to every other method of cure; as by means of it, we have it in our power to excite almoſt any degree of inflammation, without any of the diſadvantages that ſometimes enſue from the extenſive cicatrix of a large wound. In the fiſtula in ano, however, the ſeton cannot be employed; for the irritation that it would excite, would prove too ſevere a ſtimulus for the rectum, with which it would at all times be in immediate contact.

As in this ſituation, therefore, aſtringent and eſcharotic injections and paſtes cannot be employed with ſafety, as preſſure is inadmiſſible, and as cords of even the ſofteſt materials would excite a very inſupportable degree of irritation; we are under the neceſſity of employing the only other remedy by which a due degree of inflammation can be induced, namely, a free and extenſive inciſion along the whole courſe of the ſinus, commencing at one

one end of it, and terminating at the other.

Having thus endeavoured to aſcertain the proper method of cure, we ſhall now proceed to deſcribe the eaſieſt and moſt effectual manner of putting it in practice.

The courſe of the different ſinuſes having been diſcovered by a previous ſearch in the manner I have adviſed, as it is of importance to have the alimentary canal, and particularly the rectum, emptied, a purge ſhould be given on the preceding day, and a glyſter an hour or two before the operation.

The operation is often done while the patient ſtands with his back to a clear light; but it anſwers better to place him upon a table, in the ſame manner as is done for the operation of lithotomy, with his legs bent and kept aſunder by an aſſiſtant on each ſide.

The patient being firmly ſecured in this ſituation, the ſurgeon, after dipping the fore-finger of his left hand in oil, ſhould paſs it as far as it will reach into the rec-

tum: With his right hand, he muſt now enter the point of the probe-pointed biſtoury, at the external opening of the ſore; and having paſſed it along the whole length of the ſinus, till he feels the point of it through the opening in the gut, upon his finger in the anus; (for I am here ſuppoſing that a communication takes place between the ſinus and the rectum); he is now to puſh the point of it in upon his finger; by means of which, he not only protects the oppoſite ſide of the gut, but, by thus directing the point of the inſtrument, he cuts ſteadily, and the ſinus is in this manner laid open with much eaſe from one end to the other. This being done, if any other external openings are perceived, the finger ſhould be again paſſed into the rectum, and every ſore that is met with ſhould be laid open in the ſame manner. The biſtoury to which I allude is delineated in Plate LXIV. fig. 2. and 3.

By many it is ſuppoſed, that every external opening that occurs here, communicates

cates with a ſeparate and diſtinct ſinus; and ſome have gone ſo far as to ſay, that theſe again are commonly found to communicate by ſeparate openings with the gut. This, however, is ſeldom or never the caſe; for I have very univerſally found, that all the external ſinuſes communicate with one common ſore or abſceſs, and that this, in a great proportion of caſes, perhaps in ninety-nine of every hundred, communicates with the rectum by one aperture only: and, at any rate, the means to be employed, are in both caſes the ſame. Whether the external or internal openings communicate with one or with more abſceſſes, they ſhould be laid freely open from one end to the other.

In almoſt every inſtance, however, we find, that when the principal ſinus is laid open through its whole courſe, from the entrance of the knife to the aperture in the rectum, the others are found to run no farther than into ſome part of the ſore, without communicating directly with the gut;

gut; ſo that their entire diviſion is eaſily and quickly accompliſhed.

I have deſired, in ſearching for the different ſinuſes, that this part of the operation may be accurately done; ſo that it may be known with certainty, whether the ſores communicate with the gut or not: If a communication is diſcovered, the knife ſhould enter by this opening from the ſinus into the gut; for the opening is commonly at the moſt ſuperior point of the ſinus, and it is likewiſe proper that the knife ſhould be made to paſs in ſuch a direction that the aperture into the gut may form a part of the inciſion: For, if this ſhould not be done, little or no advantage might be derived from the operation; the parts would not readily adhere at this point; and the fæces getting acceſs to the cellular ſubſtance behind the gut, would be apt to give riſe to a new collection of matter.

It frequently happens, however, that no direct communication can be diſcovered between the ſinus and rectum; in which caſe

caſe the fiſtula, as I have already remarked, is ſaid to be incomplete: But, in the method of cure, the treatment is nearly the ſame as when ſuch a communication takes place; only with this difference, that in the latter, the point of the biſtoury paſſes into the gut at the aperture found in it; whereas, in the other, an opening muſt be made in it at the ſuperior part of the ſinus, by puſhing the point of the biſtoury againſt the finger in the rectum; and this being done, the operation is to be finiſhed in the manner I have mentioned, by drawing the point of the inſtrument out at the anus, ſo as to divide the ſinus through its whole length.

In the courſe of this operation, the ſphincter ani is always divided if the fiſtula penetrates to any conſiderable height in the rectum: But this is not of ſuch importance as at firſt ſight might be imagined; for although ſome degree of inability to retain the fæces frequently enſues for a ſhort while after the operation, yet experience ſhows that the parts in general recover

recover their tone very completely, inſomuch that want of retention is ſcarcely ever at laſt mentioned by the patient, as any of the inconveniencies that enſue from it.

Various inſtruments have been propoſed for effecting this operation; but none of them anſwer the purpoſe with ſo much eaſe and ſafety as the probe-pointed biſtoury. A razor, with a probe-point, Plate LXII. fig. 1. may be uſed in nearly the ſame manner; but the biſtoury is poſſeſſed of all the advantages attending the razor, and as it can be directed with more ſteadineſs, it ought to be preferred.

Some have objected to this mode of operating, that in the caſe of an incomplete fiſtula, the point of the biſtoury, on being puſhed through the gut, will be apt to hurt the finger in the rectum; and likewiſe, that it can never be applicable where the ſinus runs farther up the rectum than the finger can reach; and with a view to obviate theſe inconveniencies,

different

different inſtruments have been propoſed, particularly a director and ſcalpel.

The director, which ought to be large, being paſſed into the rectum, the ſinus or fiſtula is adviſed to be laid open through its whole length, by a ſcalpel being made to run along the whole courſe of it from the external opening of the ſinus. This, I muſt obſerve, however, is a practice not to be imitated: The hazard attending it is evidently indeed ſo great, that it has ſeldom been attempted, nor will it probably be ever recommended but by ſuch writers as copy from one another. The parts chiefly affected by the operation, lie ſo contiguous to organs that ought not to be injured, particularly to the bladder, that we ſhould never on any account attempt to lay ſinuſes in this ſituation open, unleſs the finger is previouſly introduced to ſerve as a guide for the biſtoury; and for the ſame reaſon the inſtrument ſhould never be carried farther than the length of the finger. Fiſtulous ſores do not commonly penetrate deeper

deeper here than the length of the fore-finger: In ſome caſes, however, they go to a greater depth: They have even been found to paſs to the very ſuperior part of the os ſacrum, and acroſs the pelvis in a direction between the rectum and bladder. In every ſuch inſtance, however, all that an operator ſhould attempt, is to lay the under part of the ſore completely open, ſo as to procure as free and eaſy a diſcharge to the matter as poſſible; for any advantage to be derived from the inciſion being carried to a greater depth than the finger can reach, would ſeldom if ever compenſate the hazard of the attempt: And whenever the ſinuſes are confined to the under part of the gut, no other director than the finger is required; for whoever has done the operation in the manner I have adviſed, will find that the rectum is eaſily pierced with the probe-pointed biſtoury, and that it may be done without hurting the finger previouſly paſſed into the gut.

It

It is alleged by ſome, that danger may occur from ſinuſes in this ſituation being cut freely open: Troubleſome hæmorrhagies, they think, may happen, from the hæmorrhoidal arteries and veins being cut; ſo that it has been propoſed to open the ſinuſes with ligatures: By inſerting one end of a piece of pliable ſilver or lead along the courſe of a ſinus, puſhing it into the rectum, drawing it out at the anus, and twiſting the ends of it together, the contained parts are thus directed to be gradually compreſſed and divided. But this being not only more painful, but alſo more tedious, than the method of dividing theſe parts with a biſtoury, and as we have few inſtances of the hæmorrhagy that enſues from this operation being ſevere, the latter is very univerſally preferred: The late Mr Deſſault of Paris, a ſurgeon of much eminence and reſpectability, conceived, indeed, a partiality for the method of curing this diſeaſe with a ligature, formed of lead or ſilver wire, and he contrived a very ingenious apparatus

ratus for paſſing the lead; but for the reaſons that I have given, there is no reaſon to ſuppoſe that it will ever be much employed by others.

The different ſinuſes being laid open with the biſtoury, much care is required in applying the dreſſings, for on this the ſucceſs of the operation in a great meaſure depends. Some, however, are ſo inattentive to this, as to ſuppoſe that every thing neceſſary is done, when the diviſion of the parts is completed; but this is ſo from far being the caſe, that I may freely aſſert, that a cure will ſeldom be obtained, if much attention be not given to the ſubſequent treatment of the ſores.

The parts, however, ought not to be much crammed with dreſſings; nor ſhould any thing be employed that is not perfectly mild, and incapable of exciting much irritation. Dry lint is almoſt the only application that practitioners uſe, but it is ill ſuited for the purpoſe. One of the moſt diſtreſsful ſymptoms that enſues to this operation, is diarrhœa, attended with teneſmus,

neſmus, or a frequent deſire to go to ſtool. In ſome, the diviſion of the ſinuſes alone appear to excite this; but it very commonly may be traced as a conſequence of the after management of the ſores: For every application that is not perfectly mild, and eſpecially if forcibly puſhed to the bottom of the wound, is ſure to induce a very diſtreſsful degree of irritation in the end of the gut; and as this almoſt always excites a frequent diſcharge of fæces, that not only tends to reduce the ſtrength of the patient, but to interrupt the cure of the ſores, it becomes highly neceſſary to avoid it.

With this view, inſtead of dry lint, I have long been in the practice of uſing fine thin old linen dipped in oil or ſpread with any ſimple mild ointment; by which we with certainty avoid that diſtreſsful irritation which dry applications to ſuch ſores never fail to induce. After the wounds, therefore, have been cleared, a very ſmall pledget of this kind of linen, thinly covered with ſimple liniment of wax and oil,

ſhould with the end of a probe be gently inſerted between their edges; but not to ſuch a depth, or with ſuch force, as to give any kind of uneaſineſs. This being done, and a cuſhion of fine tow, covered with a compreſs of ſoft linen, being applied over the parts, and ſecured with a T bandage, the patient ſhould be carried to bed; and the dreſſings being renewed, either after every ſtool, or, when theſe are not frequent, once in the twenty-four hours, the ſore will in general fill up from the bottom, and will at laſt cicatrize in the ſame manner as wounds in any other part. This kind of ſore ſhould indeed be managed in every reſpect like ſimilar ſores in other parts of the body: For although ſomething myſterious or peculiar has commonly been ſuppoſed to exiſt in ſores about the anus; yet this is by no means the caſe: They are of a nature exactly ſimilar to ſores in other parts, and are to be cured at all times by the ſame means. They ſhould be lightly and eaſily dreſſed, in the manner I have adviſed. No injec-

tions

tions ſhould be uſed, as is often done with a view to cleanſe the parts. They are not more neceſſary here than in any other ſore, and I have conſtantly ſeen that they do harm. They not only irritate and inflame the parts to which they are applied, but if uſed with much force, the liquor is apt to find its way into the contiguous cellular ſubſtance, and in this manner to form new ſinuſes. They ſhould in no inſtance therefore be employed.

I have already obſerved, that, by perſeverance in this mild courſe of treatment, a cure will, in general, be obtained. But in ſome inſtances it is otherwiſe; and inſtead of a good diſcharge, and red freſh granulations, with which the wound in a healing ſtate ought to be covered, the parts become ſoft, flabby, and unhealthy, and the matter is thin, fetid, and perhaps mixed with blood. If, on a minute inſpection of the ſore, any part of a ſinus is found to have eſcaped notice, and if matter is found to lodge in it, a certain and almoſt immediate advantage will be

derived from laying it open to the bottom. The moſt frequent cauſe of failure indeed in this operation is want of attention to this very neceſſary point; in the firſt place, by due pains not being taken to diſcover the ſinuſes in the time of the operation, and a deſire afterwards to perform the cure by any other means rather than put the patient to the pain of another operation, or candidly to avow our own error, which in every inſtance ſhould freely be done. I readily own, that when I firſt ſettled in buſineſs, I fell into this error, in different inſtances: By not ſearching with ſufficient pains after the firſt inciſion was made, ſinuſes eſcaped notice that might have been diſcovered: but having long been convinced, that a patient had better be kept much longer on the table, ſo as to have all the parts examined in the moſt accurate manner, than to incur the riſk of a ſecond operation, I now ſpend ſo much time upon this, that in the courſe of theſe eighteen or twenty years, ſcarcely an inſtance has occurred with me,

out

out of ſome hundred caſes, of the operation being from this cauſe to be repeated: I own, however, that more time is for this purpoſe ſpent on the operation than is commonly done.

It ſometimes, again, happens, that the cure of the ſore is retarded, not by any fault in the operation, but by real diſeaſe of the ſyſtem: In this caſe, if the patient is found to labour under lues venerea, ſcrofula, or ſcurvy, the remedies appropriated to the exiſting diſeaſe ſhould be preſcribed; or if the conſtitution is merely relaxed or weakened, whether by fever or any other cauſe, the natural tone of the ſyſtem ſhould be reſtored, by a nouriſhing diet, a proper allowance of wine, and reſidence in good air.

When treating of Ulcers in Chapter V. I have endeavoured to inculcate the utility of iſſues in every variety of ſore; but in no variety of the diſeaſe does this remedy act with more advantage than in the fiſtula in ano, eſpecially when the diſcharge has been of long duration. Different in-

ſtances, indeed, have occurred to me, in which, where iſſues are not inſerted, the patient was obviouſly injured by curing the diſeaſe: Other diſeaſes of a more alarming nature were induced by it; while in ſome I have not been able to obtain a permanent cure of the ſinus till an iſſue was inſerted: I am now therefore ſo much convinced of the utility of iſſues, that whenever the diſeaſe has been of long duration, and the diſcharge copious, I ſeldom adviſe the operation till an iſſue is inſerted.

Hitherto, I have been ſuppoſing, that the diſeaſe has not advanced farther than to produce ſinuſes along the courſe of the rectum, and parts immediately contiguous. We ſhall now proceed to conſider it in its more advanced ſtages.

The firſt of theſe that I ſhall notice, is that in which the parts lying contiguous to the ſores, have been ſeparated or detached from each other, by a mere effuſion of matter into the ſurrounding cellular ſubſtance. This, to a certain degree, is the

the caſe in ev ry ſinus; but when ſinuſes about the anus have been of long duration, the matter which they produce, if it does not find a free outlet, ſpreads in ſome inſtances ſo extenſively among the contiguous parts, as to ſeparate, not only all the ſkin and other teguments from the muſcles underneath, but to detach all the under part of the rectum from the cellular ſubſtance with which, in a ſtate of health, it is firmly connected. Of this I have now met with various inſtances.

In this ſtate of the diſeaſe, two modes of operating have been adviſed; either to take away a conſiderable portion of the teguments, ſo as to give free vent to the matter; or, if this does not prove ſucceſsful, to extirpate all the inferior part of the rectum that is found to be ſeparated from the contiguous parts.

Theſe operations, however, not only give ſevere temporary pain, but much ſubſequent diſtreſs; and as all the advantages that ariſe from them may be attained in a more eaſy manner, they ought undoubted-

ly to be laid aſide.—To take away any large portion of the teguments about the anus, muſt of itſelf be extremely painful; and to extirpate the extremity of the rectum, would, in a great proportion of caſes, be productive of more miſery than could ever be induced by a continuance of the diſeaſe; for, beſides the difficulty and pain that in this ſituation would ariſe from the paſſage of hard fæces, it would be impoſſible for the patient to retain liquid ſtools.

This diſtreſsful operation, however, need never be put in practice; for I know from various trials, that a ſimple diviſion of the gut will with more certainty accompliſh a cure: All that ought to be done therefore is, to lay the detached portion of gut open from one end to the other in the manner I have already pointed out in caſes of ſimple ſinus: And if this does not allow the gut to apply equally to the contiguous parts, another inciſion ſhould be made on the oppoſite ſide of it; by which means all ſuch parts of it as were ſeparated or detached from

from the ſurrounding muſcles will now be equally applied to them; no part of it will be puckered or unequal; and if the neighbouring bones and other parts are ſound, and the conſtitution not diſeaſed, a cure will ſoon be obtained by adheſion again taking place between the gut and parts that lie behind it.

Upon the ſame principles that in this ſituation we adviſe a diviſion of the rectum, when the matter has paſſed between the ſkin and muſcles of the perinæum, or of the hips, the bag in which it is contained ſhould be freely laid open from one end to the other; and if one inciſion is not ſufficient, another ſhould be made without delay: The ſame dreſſings ſhould be applied here that I have already adviſed where the ſinus runs behind the rectum.

Hitherto I have ſuppoſed that the fiſtula or ſinus diſcharges its contents by one or more external openings in the neighbourhood of the anus: This, however, does not always happen; and the matter, inſtead of being diſcharged by an external opening,

is,

is, in ſome inſtances, firſt emptied into the gut, and afterwards diſcharged, either by itſelf, or mixed with fæces on the patient going to ſtool. This, as I have already obſerved, forms what has been termed an Occult Fiſtula, or, according to French authors, une Fiſtule Borgne.

As the uſual and moſt certain characteriſtic of fiſtula, namely, an external opening diſcharging matter, is here wanting, ſome attention is required to aſcertain its exiſtence, as well as to prevent it from being confounded with other diſeaſes.—Thus, matter diſcharged from abſceſſes in the upper part of the alimentary canal, has, in ſome inſtances, been ſuppoſed to proceed from an occult fiſtula in the neighbourhood of the anus; and vice versâ, pus collected in and diſcharged from an impoſthume near to the anus, has, merely from want of attention, been ſuppoſed to originate from diſeaſe in the upper part of the gut; and upon this ſuppoſition, remedies have been preſcribed without effect,

when

when a complete cure might have been obtained by very ſimple means.

The diſtinction, however, between theſe diſeaſes is, in general, ſufficiently evident. When matter collected in the ſuperior part of the gut, is at laſt diſcharged by ſtool, it is commonly thoroughly mixed with, and ſeems to conſtitute a part of, the fæces, and no pain takes place near to the anus. But in the caſe of an occult fiſtula, the matter diſcharged by ſtool is not mixed with the fæces; on the contrary, they always appear diſtinct and ſeparate; on minute inveſtigation, ſome degree of hardneſs, ſwelling, or diſcoloration, is always diſcovered near to the fundament; and in this ſpot a conſiderable degree of pain is felt on preſſure.

Various means have been propoſed in caſes of occult fiſtula, for diſcovering the ſite of the abſceſs. By ſome we are adviſed to paſs a curved probe up the rectum; and to ſearch with the point of it till the opening is diſcovered, when, by puſhing it forward, it may paſs into the abſceſs:

abſceſs *: Others, again, adviſe a thick firm tent to be puſhed into the rectum, ſo as to obſtruct every means of communication between the ſinus and gut; and by this they ſuppoſe, that the matter of the abſceſs may be made to collect in ſuch quantities as evidently to point out its ſituation. Neither of theſe methods, however, are neceſſary, nor is it probable that they would often ſucceed.

Whenever an abſceſs is ſeated near to the verge of the anus, however ſmall it may be, it may be eaſily diſcovered: For, ſome degree of hardneſs, a ſmall tumefaction, and moſt frequently ſome diſcoloration, is obſerved at ſome part contiguous to the extremity of the gut; and whenever this mark is perceived, and eſpecially if preſſure excites much pain, there will be no cauſe to doubt of this being the ſeat of the abſceſs.

In ſuch circumſtances, what are we to do? We ought here to have the ſame object in view, as if the matter had been diſcharged

* Vide Dionis—Courſe of Operations, Demonſtr. iv.

charged by an external opening: For the diſeaſe is in reality the ſame, and differs only in this ſingle circumſtance from the moſt frequent variety of fiſtula, that the matter is in this caſe firſt thrown into the rectum, before it can be diſcharged, inſtead of coming freely off by one or more external outlets near to the anus. And as the two varieties of the diſeaſe are very nearly the ſame, ſo the means neceſſary for their removal are very ſimilar.

As ſoon as we have determined to perform the operation, the point of a lancet ſhould be plunged into the tumefied or diſcoloured ſpot; and upon the point of the inſtrument reaching the abſceſs, which is at once known by a diſcharge of pus taking place, as the diſeaſe is thus reduced to the ſtate of a ſimple, complete fiſtula, the operation is to be finiſhed in the ſame manner as I have already adviſed for that variety of the diſeaſe; by the introduction of the finger of the left hand into the anus, paſſing the probe-pointed biſtoury in at the wound newly made, and, on its point being

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ing diſcovered by the finger in the rectum, by drawing it out in ſuch a manner as to divide the abſceſs or ſinus through its whole length;—and the ſubſequent treatment of the ſore is alſo the ſame as in other caſes of fiſtula.

All that has been as yet ſaid relates to the mildeſt and moſt ſimple ſtages of fiſtula; the parts chiefly affected being ſuppoſed to be in no other way diſeaſed, than by having an abſceſs ſeated in them, either occult, or with one or more external ſinuſes running into it.—But when by neglect, or improper treatment, the matter collected in ſuch abſceſſes does not find a free vent, the contiguous parts inflame, become painful, and in a gradual manner acquire much morbid hardneſs or callofity.

In ſuch circumſtances, various remedies have been adviſed: As a previous ſtep to any operation, it has been propoſed by ſome to diſſolve this hardneſs or callofity, by the uſe of mercury, aided by ſuppurative or emollient poultices.—Others adviſe

viſe the hardened parts to be deſtroyed with cauſtic; but the opinion that has till of late moſt generally prevailed, is, that all the callous parts ſhould be extirpated with the ſcalpel.

But whoever has had opportunities of becoming acquainted with this branch of practice, will know, that it is perfectly impoſſible to diſſolve or diſſipate any calloſity that has been of long duration, either by poultices, mercurials, or other diſcutients; and it luckily happens, that a cure may in general be obtained by means of a more gentle nature than the deſtruction of the hardened parts, whether by cauſtic or extirpation: When the parts cannot be preſerved but at the hazard of the patient's life, they ought undoubtedly to be removed; but as neceſſity alone ſhould point out the propriety of ſuch a painful and violent meaſure, it ſhould never be adviſed when our views can be accompliſhed in a milder manner.

I have endeavoured to ſhew, and indeed the fact is obvious to all who will be

be at the trouble of obſerving, that the callous ſtate of the parts that often takes place where the diſeaſe has been of long duration, is uniformly the effect of the matter not finding a free vent, and of its being thereby forced to diſperſe among the contiguous muſcles; by which, pain, inflammation, and hardneſs, are ſucceſſively and neceſſarily produced.

If this is a true ſtate of the matter, and all practitioners of experience will probably admit that it is ſo, it muſt be obvious, that there can be no need of ſuch violent remedies as thoſe I have mentioned, namely, the removal of the diſeaſed parts either with cauſtic or the ſcalpel: The means of relief to be employed here, are merely ſuch as will afford a free outlet to the matter, whilſt they alſo ſerve to induce and preſerve a diſcharge of matter in the ſubſtance of the diſeaſed parts, and which I am inclined to conſider as the moſt effectual method hitherto diſcovered for the removal of all ſuch morbid calloſities.

Through

Through the whole of this chapter, I have avoided the uſe of the word Schirrus; and I am here particularly anxious to have it remarked, that I have done ſo: For in real ſchirrus, the remedy I have now pointed out, namely, the excitement of ſuppuration in the ſubſtance of the diſeaſed parts, would probably prove highly pernicious, by forcing quickly forward to a ſtate of cancer, a tumor, which, if left to itſelf, might probably have remained indolent for a great length of time. It is therefore evident, that an accurate diſtinction between real ſchirrus, and other hard tumors, is a point of much moment. Every hard tumor that from experience is known to be apt to degenerate into cancer, I would denominate Schirrus. Now, we know very well, that cancers rarely attack tumors that are not glandular: So that to every indurated ſwelling of the cellular ſubſtance, and other ſoft parts not evidently glandular, a different appellation ſhould be given: All of theſe may, with pro-

priety enough, be denominated callous tumors.

Thoſe hard tumefactions, therefore, ſeated in the cellular ſubſtance near the anus, as they never appear to degenerate into cancer, I have termed Callofities: The moſt effectual remedy that I have tried for the removal of theſe, is a free ſuppuration induced in them; and the beſt method of effecting this, is by laying every ſinus that can be diſcovered, freely open from one end to the other; and when the ſinuſes are not numerous, it proves even uſeful to make one, two, or more deep inciſions along the whole extent of the induration. By carrying the inciſion to the full depth of the indurations, ſuch a plentiful flow of matter enſues to the inflammation that they induce at firſt, as commonly acts with much advantage in the cure.

Indeed none can imagine how highly beneficial this practice proves, but thoſe who have experienced the benefit that enſues from it: In various inſtances, I have known it ſucceed completely where the total

total removal of the diſeaſed parts had previouſly been judged to be indiſpenſable. Where the diſeaſe has been of long duration, the remedy muſt indeed be long perſiſted in; that is, a plentiful diſcharge of pus muſt be long preſerved, either in the inciſions firſt made, or, if theſe heal too quickly, in others made to ſucceed them.

In ſome inſtances, theſe inciſions do not eaſily ſuppurate; their edges inflame, become painful, and diſcharge a thin fetid matter. When this proceeds from lues venerea, or any other diſeaſe of the conſtitution, this muſt be firſt removed, before the inciſions will yield good matter. But when the ſyſtem is otherwiſe healthy, and when there is therefore reaſon to imagine that the untoward ſtate of the ſores proceeds merely from irritation, or ſome other local affection, in ſuch circumſtances, warm poultices prove highly uſeful: By their emollient properties, they tend to remove irritation with more effect than any other remedy; and I have

elſewhere ſhewn, that nothing acts with ſuch certainty in the formation of good pus.

In every caſe, therefore, of fiſtula, attended with much hardneſs and tumefaction of the contiguous parts, inſtead of removing the hardened parts either with cauſtic or the knife, the practice I would adviſe is this:—The ſinus or fiſtula ſhould be treated in the ſame manner as if no hardneſs exiſted; that is, it ſhould be laid freely open from one end to the other: If more ſinuſes are diſcovered, theſe ſhould alſo be laid open; and if the hardneſs in the contiguous parts extends either laterally, or in any other direction beyond the courſe of the ſinuſes, one or more deep inciſions ſhould be made along the whole length of it: And by preſerving theſe inciſions in a ſuppurative ſtate till the hardneſs is diſcuſſed, they may then be allowed to heal from the bottom in the ſame manner with wounds or ulcers induced by any other cauſe.

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By this management alone, when the conſtitution is otherwiſe healthy, the very worſt variety of Fiſtula may be cured with more certainty, and with much more comfort to the patient, than by the extirpation of the hardened parts. Indeed, ſcarcely any caſe, I think, can occur, of the parts being in ſuch a ſtate as to render it proper to remove them, if they have not been long and almoſt entirely ſeparated from the ſubjacent muſcles, with which, in a healthy ſtate, they ought to be connected. This, again, can never take place, but from very groſs miſmanagement: When we do, however, meet with it, and when the hardened parts are ſo much detached from the others, that they would not probably adhere again, neceſſity points out the propriety of cutting them off; and in external ulcerations of theſe parts, when the edges of the ſores have become hard and reverſed, the cure may be promoted by removing the diſeaſed parts; but in no other inſtance ought this practice to be attempted; for all the advantages ſaid to

be derived from it, may be obtained with much more eaſe and ſafety from the method of cure I have here pointed out.

The only other ſymptoms connected with fiſtula in ano, to which I have not yet adverted, are ſuch as ariſe from affections of deep-ſeated parts; namely, ſuch as proceed from diſeaſe of the os coccyx, os ſacrum, bladder, and parts about the loins.

It ſometimes happens, that the matter collected in fiſtulous ſores about the anus, by being allowed to ſpread among the neighbouring parts, comes at laſt even to injure the bones themſelves; but inſtances likewiſe occur of diſeaſes of the bones being the primary affection, and of its giving riſe to, inſtead of being produced by, ſinuſes about the rectum. Thus, collections of matter on the pſoæ muſcles, originating, in ſome inſtances, from caries of the lumbar vertebræ, inſtead of falling down and pointing, as they commonly do, in the upper and fore part of the thigh, are ſometimes found to follow the courſe

of

of the inteſtines, and to diſcharge their contents at the ſide of the rectum. A ſevere bruiſe, too, upon the hips and contiguous parts, by injuring the os coccyx, has, in ſome inſtances, produced the ſame effect.

But the moſt diſtreſsful circumſtance that ever accompanies fiſtula in ano, is the formation of a paſſage between the rectum and bladder. This ſometimes happens indeed, where no ſinus or abſceſs had previouſly appeared about the anus; but it more frequently ſucceeds to ulcerations in theſe parts, and by theſe being improperly treated, than to any other cauſe. The ſymptoms by which the exiſtence of this dreadful malady is with moſt certainty known, are, in the firſt place, an unuſual, dark brown, thick ſediment, being obſerved in the urine, which by degrees becomes of a darker colour, and of a more offenſive fæcal ſmell; air is frequently diſcharged in conſiderable quantities by the urethra, both before and after voiding urine; and in the latter ſta-

ges of the diſeaſe, the urine does not get a free vent from the bladder.

The exiſtence of theſe ſymptoms, ſerves ſufficiently to aſcertain the nature of the diſeaſe; but hitherto we have not been able to diſcover any means of removing it. So that all who have yet been attacked with it have at laſt fallen victims, after dragging on, twelve, eighteen months, or perhaps a few years of a miſerable exiſtence.

In the event of any of the bones of the coccyx, ſacrum, or lumbar vertebræ, becoming carious, from the matter in this diſeaſe having been allowed to penetrate and to corrode them, all that art can do is to preſerve a free vent for the diſcharge; to keep the parts clean; to extract any pieces of looſe bone that may be diſcovered; and to ſtrengthen the conſtitution by a nouriſhing regimen, with a view to enable it to ſupport the long-continued diſcharge to which it may probably be expoſed: Some few have in ſuch circumſtances, and with ſuch a plan of management, been fortunate enough

enough to obtain cures, by ſuch pieces of bone as were ſpoiled being at laſt thrown off, and by the parts being then induced to heal. This, it muſt be confeſſed, however, is a rare occurrence; and all that, in this ſituation, we have reaſon to expect, is to be able to palliate the moſt diſtreſsful ſymptoms.

I have thus concluded what it was my intention to offer on the fiſtula in ano; and as it is a very diſtreſsful as well as a frequent diſeaſe, and eſpecially as it was never till of late deſcribed with accuracy, I have hence been induced to conſider it more minutely than I otherwiſe ſhould have done. What I have endeavoured to ſhew, and to which I ſtill wiſh to excite the attention of the younger part of the profeſſion, is, that a ſinus or fiſtula, is a diſeaſe of the very ſame nature in the neighbourhood of the anus, as in any other part of the body; and therefore, that the method of cure ought to proceed upon the ſame principles here as in ſimilar affections of other parts.

Till

Till the late improvements made in the treatment of this diſeaſe, and till the true nature of it was underſtood, much confuſion ſubſiſted in the method of conducting the cure. Except in the moſt trifling caſes of ſuperficial ſinuſes, it was never imagined that a ſimple inciſion could anſwer: Nothing leſs than a total deſtruction or removal of the diſeaſed parts was ſuppoſed to be ſufficient.

But it will now, I hope, appear, that this is very rarely neceſſary; and when a cure is practicable, that it will be more readily accompliſhed by the means I have pointed out, namely, by a mere diviſion of the ſinuſes, than by any other that has yet been propoſed. It will ſometimes happen, indeed, that, in caſes of an inveterate nature, none of the means that I have mentioned will ſucceed; but, in all ſuch caſes, no advantage would be derived from more violent remedies, and much diſtreſs would certainly be induced by them.

I have already obſerved, that the beſt form of knife that I have yet ſeen for fiſtula in ano, is one or other of the biſtouries, delineated in Plate LXIV. Thoſe who are not accuſtomed to uſe this biſtoury, are apt indeed to ſuppoſe, that it cannot penetrate the rectum but with much riſk of injury to the finger of the operator, previouſly paſſed into the gut; but this is ſo far from being the caſe, that in none of the caſes in which I have operated, and they now amount to ſome hundreds, has my finger ever been hurt: With a view, however, to obviate this difficulty, a very neat and ſimple invention has for ſome years paſt been uſed by many, and of which I have given a figure in Plate LXXX. fig. 2. and 3. and the mode of applying it will be ſeen in the explanation of the Plate. The probe-pointed biſtoury, however, when properly formed, divides the gut in a great proportion of caſes with perfect eaſe, and with no hazard, as I have endeavoured to ſhew either to the patient or operator; but where the parts meant to be

be cut are of conſiderable thickneſs, as is the caſe when the ſinus does not run contiguous to the rectum, I have ſometimes found it difficult to perform the operation with a biſtoury of any form. The difficulty, however, does not conſiſt in paſſing the inſtrument from the ſinus into the rectum, which, with the common crooked biſtoury, is in every caſe eaſily done, if the probe-pointed part of it is properly made, but in turning the point of it down, ſo as to divide the parts from the opening at which it entered, to the under part of the gut: By cutting ſlowly and deliberately, I have always been able to do it; but in one caſe, a biſtoury of conſiderable ſtrength broke while I was making the cut; and in different inſtances I have known this happen with others: This has made me wiſh to have an inſtrument for this operation ſtill more perfect than the biſtoury: Many have been propoſed, but none that has yet appeared anſwer ſo well as the biſtoury: I am at preſent uſing ſciſſars of a particular conſtruction; but I cannot as yet

yet ſpeak of them with ſuch certainty from experience, as to render it proper to lay them before the public, which, however, I ſhall do at ſome future period, if the trials that I mean to give them ſhall juſtify the opinion I have formed of them: I may here, however, ſhortly obſerve, that they conſiſt of two cutting blades, which, after being introduced ſeparately, the one into the ſinus, and the other on the finger previouſly paſſed into the rectum, are joined at their axis by a moveable pin, in which ſtate being able to act like common ſciſſars, the operation is finiſhed by a ſingle cut.

CHAP-

CHAPTER XXXIX.

Of FRACTURES.

SECTION I.

General Observations on Fractures.

SOME practitioners denominate every ſolution of continuity in a bone a Fracture; but the term may, with more propriety, be confined to diviſions in bones produced by external violence. Thus, we do not ſay that a bone is fractured, the parts of which are ſeparated from each

each other by the effect of internal diſeaſe; while we ſay that it is fractured when this happens from a fall, a blow, or a bruiſe.

Fractures are of various kinds, and are diſtinguiſhed by different names. A bone may be fractured either directly acroſs; in an oblique direction; or longitudinally: Hence the terms, Tranſverſe, Oblique, and Longitudinal Fractures. When a bone is ſplit, we ſay that it is Splintered.

When the teguments remain ſound, a fracture of a bone is denominated Simple; and we term it Compound when the fracture communicates with a wound in the ſkin and other correſponding ſoft parts. By ſome a fracture is ſaid to be Compound when a bone is broken into different parts; and thoſe Fractures they term Complicated, that are accompanied with wounds in the correſponding ſoft parts. This ſubdiviſion, however, of fractures, ſeems to be unneceſſary: For unleſs a bone is ſplintered, no eſſential difference ariſes merely from its being broken at one or two parts; whereas

whereas the ſlighteſt communication between a fracture and a wound in the ſurrounding ſoft parts, changes the nature of it ſo entirely, as often to induce much danger where no alarming ſymptoms would otherwiſe have been dreaded.

The exiſtence of fracture is, for the moſt part, eaſily diſcovered, by manual examination. A fracture of a ſingle bone, where there is only one in the fractured limb, and the fracture of both bones when there are two, as well as fractures accompanied with extenſive wounds of the contiguous ſoft parts, are eaſily diſcovered: But in ſimple fractures, where only one bone of a limb has ſuffered, it is often difficult to judge with any degree of preciſion; particularly where the contiguous parts have become tenſe and painful. In ſuch caſes, our opinion muſt be formed by a minute attention to different circumſtances; the age and habit of body of the patient; the ſite of the ſuppoſed fracture; the ſituation of the limb when the injury

was

was received; and, laſtly, the attending ſymptoms.

In old age, bones are more eaſily fractured than in earlier periods of life. In infancy, bones will rather yield than break on the application of a moderate force; whilſt in old age they become ſo brittle, that even the largeſt are frequently broken by very trifling falls and bruiſes.

Different diſeaſes induce this brittle ſtate of the bones; particularly lues venerea. Of this I have met with various inſtances. In ſome of theſe, the largeſt and hardeſt bones were broken, ſolely by the ordinary action of the muſcles of the limb. This I have alſo known happen in ſea-ſcurvy: Bones that have been fractured and long united, are apt to ſeparate in advanced ſtages of ſcurvy, the callus being either diſſolved or rendered too ſoft for the purpoſe of retaining them together.

Beſides theſe general diſeaſes of the body, the bones themſelves are liable to a diſeaſe that renders them ſoft and flexible. This is uſually termed Mollities Oſſium.

In ſome, this goes no farther than to produce that ſtate of the bones that I have mentioned, in which they are apt to be fractured by ſlight falls and ſimilar accidents: But in others, it has been known to proceed to ſuch a height, that every bone in the body has become crooked and diſtorted. I have ſeen a ſkeleton in which the condyles of the knee-joints were turned up ſo as to touch the pubes, and in which every other bone was crooked in nearly a ſimilar degree.

In judging therefore of the probability of a fracture from the degree of violence that has been applied, theſe circumſtances merit attention: For it is evident, that in old age, and in theſe diſeaſed ſtates of bones, a degree of force will produce fracture, which in other circumſtances it could not poſſibly do.

The ſite of a ſuppoſed fracture is alſo to be taken into conſideration. Bones are more apt to be broken in thoſe places where they are hard and brittle, as in the firmer parts of all the long bones, than towards

wards their extremities, where they are of a more ſoft and yielding texture; and bones that lie deep under the cover and protection of muſcular parts, as in the thighs, are not ſo frequently fractured as thoſe of the arms and legs that are not ſo well protected.

Further, the ſituation of a limb when an injury is inflicted, is an object of inquiry. Thus, a very inconſiderable weight paſſing over a bone lying on an unequal ſurface, will readily produce a fracture; while the ſame bone, equally ſupported, will bear a heavy load without being much injured.

In forming an opinion of the probability of a bone being broken, we ought laſtly, to take into conſideration the ſymptoms that uſually accompany fractures. Theſe are, pain, ſwelling, and tenſion in the contiguous parts; a more or leſs crooked and diſtorted ſtate of the limb; a crackling or grating noiſe on the parts being handled; and loſs of power to a certain degree in the injured limb.

It is true, that the mere fracture of a bone is not neceſſarily attended with much pain; for the bones, not being ſo plentifully ſupplied with nerves as the ſofter parts of the body, they are therefore of a leſs irritable nature. But pain ariſes from two circumſtances with which fractures are uſually attended; the contiguous ſoft parts being bruiſed and otherwiſe hurt, in the firſt place by the force producing the injury, and afterwards by the diſplaced ends of the bones. For the moſt part the pain indeed is not very ſevere: But in ſome it is ſo violent as to induce the moſt alarming ſymptoms; ſpaſmodic twitchings of the muſcles of the limb; high degrees of inflammation; fever; general convulſions and delirium; and if the cauſe by which theſe ſymptoms are induced be not ſoon obviated, they ſometimes even terminate in death. In general this is preceded by mortification of the parts contiguous to the fracture; but in ſome theſe ſymptoms prove fatal, without any tendency to gangrene being perceived.

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When the force by which a fracture is produced has been extenſively applied over a limb, we may readily ſuppoſe that the ſevereſt ſymptoms may be induced by this cauſe alone; but in general we find, when the pain, tenſion, and convulſive twitchings of the muſcles are ſevere, that they chiefly ariſe from the adjoining membranes, muſcles, and other ſoft parts being torn, punctured, or compreſſed, by the ends of the fractured bones: And although this may happen in fractures of every deſcription, yet it will neceſſarily be more frequent in thoſe that are ſo oblique as to admit of the bones paſſing eaſily over each other, than in tranſverſe fractures, where the parts, on being replaced, more readily remain in their natural ſituation.

The other diagnoſtic ſymptoms of fracture that I enumerated, namely, a grating noiſe on the parts being handled, and diſtortion and loſs of power to a certain degree in the injured limb, muſt neceſſarily take place in every fracture. They are

indeed much more evident in ſome fractures than in others; but in all, they may be diſcovered where the parts are not much ſwelled, excepting in the caſe of a longitudinal or ſplintered fracture. A bone may be ſplit in this direction without any of theſe ſymptoms taking place: For unleſs the divided parts be completely ſeparated from each other, neither diſtortion nor crackling will be perceived on handling them; nor will the bone be rendered altogether incapable of performing its uſual functions. In ſuch caſes, we judge of the probability of a fracture, from the violence of the injury, the ſeverity of the ſymptoms, and other circumſtances already enumerated.

Beſides theſe leading ſymptoms of fractures that take place immediately on the injury being inflicted, there are others which occaſionally occur from the firſt, and ſome that we are to conſider as conſequences rather than ſymptoms. Of the firſt, the moſt remarkable are, that great degree of ecchymoſis which in ſome caſes

ſes appears inſtantaneouſly, from the ends of a fractured bone having penetrated a contiguous artery or vein; and the wound or laceration of the teguments in compound fractures.

The moſt important conſequences of fractures are, ſtiffneſs and immobility of the injured limb; diſtortion of the parts chiefly affected, either from a fulneſs or thickneſs remaining in the contiguous muſcles or ligaments; an exuberancy of callus; a contracted ſtate of the contiguous joints; or a maraſmus or waſting of the limb itſelf. All theſe we ſhall conſider more particularly in ſpeaking of the treatment of fractures.

In judging of a fracture, and of the probable event of it, various circumſtances are to be conſidered: Particularly the age and habit of body of the patient; the ſituation of the bone, and the part of it that is injured; the nature of the attending ſymptoms; the circumſtances with which the fracture may be complicated; and the kind of fracture.

With reſpect to the firſt of theſe, namely, the age and habit of body of the patient, we all know that they are points of much importance in the cure of every injury; and in none more than in fractures. Thus in youth, particularly in infancy, fractures are more quickly cured than in old age; and in ſound conſtitutions, more readily than in thoſe that are diſeaſed. I have obſerved above, that the bones ſometimes become brittle in lues venerea; and it may here be remarked, that the exiſtence of lues venerea and ſcurvy, is particularly adverſe to the reunion of fractured parts. I have met with ſome exceptions to this, where fractures have united readily even in advanced ſtages of lues venerea: But this is uncommon; and where lues venerea has attacked the bones, a firm callus ſeldom forms till the virus is eradicated.

In ſpeaking of the effect of age on the cure of fractures, although I admit that the divided parts of bones unite more ſpeedily in infancy than in old age, yet I think

think it right to remark, that they do not reunite with more certainty. By many we are told, that in advanced periods of life, the union of fractured bones is often not to be accompliſhed. I have never, however, ſeen an inſtance of this, although I have had the management of many fractures even in extreme old age.

The ſituation and part of the injured bone, are both circumſtances that merit attention. Thus we know, that fractures of the ſmall bones of the arms and legs, of the feet and hands, and of the ribs, in general heal eaſily; while fractures of the larger bones, particularly of the femur and humerus, are managed with more difficulty. In the laſt, indeed, one principal cauſe of the cure proving tedious, is the difficulty of retaining the ends of the bone together.

When any of the large bones are fractured near to their extremities, we find the danger is greater, and the proſpect of a complete cure much leſs, than when they are broken near to their middle: For here the

the ſhortneſs of one end of the bone makes the retention difficult; and the ſymptoms that enſue from fractures in this ſituation are apt to be particularly ſevere, not only from the contiguity of the capſular ligaments of the joints, which may thus be injured, but from the numerous tendons that are inſerted into theſe parts of the bones; which may not only be lacerated and bruiſed, but even torn from their inſertions. Beſides, the ends of bones are not only ſoft, but even ſpongy or cellular in their texture, by which fractures in theſe parts do not unite ſo equally; the parts more frequently exfoliate, and matter is more apt to form in them: Hence when fractured they are more tedious in the cure, and give riſe to more troubleſome ſymptoms, than ſimilar accidents in the harder parts of bones.

It is alſo proper to remark, that fractures near the extremities of bones are frequently productive of ſtiff immoveable joints, unwieldy limbs, pains and ſwellings; which, in various inſtances, even under

under the beſt treatment, continue obſtinate for a great length of time, and in ſome caſes even during the life of the patient.

We are in general led to ſuppoſe, that theſe conſequences ariſe ſolely from miſmanagement, either on the part of the ſurgeon or of the patient. That in ſome inſtances this is the caſe, no perſon will doubt. The ends of a fractured bone may be improperly placed from the firſt by the practitioner, or they may be afterwards miſplaced by the patient; and in either caſe we may conceive that all the ſymptoms I have mentioned will take place. But in juſtice to the profeſſion, I muſt obſerve, that they more frequently ariſe from the ſituation and nature of the fracture than from any other cauſe. Nor is it ſurpriſing that it ſhould be ſo. When we conſider the various circumſtances with which fractures are often accompanied; the degree of violence required to break a large bone; the ſevere contuſion of the contiguous ſoft parts which this muſt produce;

duce; and the laceration of nerves, muſcles, and ligaments, that muſt occur from the ſpiculæ of fractured bones; we ſhould rather expect that they would more frequently induce diſtreſsful conſequences than we actually find to be the caſe.

In forming a judgment of the nature and probable event of fractures, the ſymptoms merit particular attention. If the ſymptoms are moderate, when compared with the violence that the parts have ſuffered, our prognoſis ſhould be proportionally favourable: But when the attending ſymptoms are ſevere, particularly if the pain is uncommonly violent, and the ſwelling and tenſion conſiderable, however trifling the force may have been by which the fracture was produced, the caſe will probably be difficult to manage, and uncertain in the event. In ſuch circumſtances, therefore, even in ſimple fractures, our prognoſis ſhould be guarded.

The circumſtances with which a fracture may be complicated, are likewiſe of importance; and unleſs they are duly weighed,

weighed, no accurate judgment can be formed of the event. The contiguous muſcles and other ſoft parts may be ſeverely contuſed; ſome of the ligaments and tendons of the injured part may be ruptured, or even torn from their inſertions; and the fracture may be combined with a diſlocation of one or both of the contiguous joints. Theſe accidents in every inſtance aggravate the danger.

The laſt conſideration on this ſubject reſpects the kind of fracture. The greateſt difference is obſerved between the event of a ſimple and of a compound fracture. A great proportion of caſes of ſimple fracture are of a mild nature from the firſt; and with very ordinary attention, complete cures are obtained: But in compound fractures, the ſmalleſt external wound communicating with the injury in the bone, will often produce the greateſt danger. I do not mean to ſay that this always happens; on the contrary, we know that even the worſt caſes of compound fractures will, with proper attention,

tion, often terminate in a favourable manner: But every practitioner verſant in this branch of buſineſs, will allow, that this is ſeldom the caſe; and that even under the beſt management ſuch caſes are ſo apt to go wrong, as to warrant the opinion that I have given of them, and to render it proper in almoſt every inſtance to give a guarded prognoſis.

Various indications have been propoſed for the cure of fractures; and thoſe we are deſired to have particularly in view, are, extenſion; counter extenſion; coaptation, or replacement of the fractured parts; deligation, in ſo far as is neceſſary for retaining them; poſition of the injured part; and prevention or removal of bad ſymptoms.

The ſubject, however, may be ſimplified, and the indications with propriety reſtricted to three: To replace the parts of the bone that have been moved from their natural ſituation; to retain them in this ſituation as long as may be neceſſary; and

and to obviate ſuch ſymptoms as may ſupervene during the cure.

In ſome few favourable caſes, where the bones are fractured directly acroſs, they are either not moved out of their natural ſituation, or the alteration is ſo inconſiderable that they are eaſily replaced. But when the bones of a limb are broken in an oblique direction, they are apt to paſs one another ſo as to produce much deformity and pain. The contiguous muſcles are thus ſeverely injured, and excited to violent action: Hence the malady is increaſed by every exertion; and nothing will remove it but an artificial replacement of the diſtorted bones.

To accompliſh this, various methods have been propoſed. In former times it was done by much violence and force; by what was termed Extenſion and Counter Extenſion: But we now know that our purpoſe may be accompliſhed in an eaſier manner, with leſs pain to the patient, and leſs trouble to the operator.

As

As long as it was imagined that much force was neceſſary, the limb was extended by one or more aſſiſtants pulling at each end of it; and when this was not ſufficient, different machines were employed for it. This force was in general applied while the limb was ſtretched out or extended, by which it became much more difficult to reduce the diſplaced ends of the bone: For in this manner all the contiguous muſcles were put into action; nor could the bones be replaced till this was overcome by the application of a ſuperior force. The miſchief that this would often produce, it is eaſier to imagine than expreſs.

When it is conſidered, that in the reduction of fractured bones, the chief reſiſtance ariſes from the action of the correſponding muſcles, the propriety of placing the limb in ſuch a poſture during the operation, as may favour the relaxation of theſe muſcles, is ſo evident, that we now reflect with ſurpriſe, that it ſhould have been left to the practitioners of the preſent

preſent age to propoſe it. For, whatever may have been the opinion of a few, it is certain, that till lately it was the general practice to keep every limb in an extended poſition while any attempt was making to replace the fractured bones, and that it is chiefly to the late Mr Pott we owe the preſent improved ſtate of this important branch of chirurgical practice.

If in the treatment of fractures, we take care to relax all the muſcles of the limb, it is ſurpriſing with what eaſe the ends of the bones may in general be replaced. When a limb is laid completely in this relaxed poſture, the ſurgeon will in moſt caſes be able to replace the bones without any aſſiſtance: But when this does not ſucceed, a ſlight degree of extenſion may be employed, by the upper part of the limb being kept firm by one aſſiſtant with his hands placed between the fracture and the contiguous joint, while the under part of it is gently extended by another; care being ſtill taken,

however, to keep the muſcles as much relaxed as poſſible.

As it is of much importance, in replacing the fractured parts of a bone, to do it with accuracy, the moſt minute attention ſhould be given to this part of the operation. Every inequality depending upon any portion of a diſplaced bone, ſhould, as much as poſſible, be removed, ſo as to render the injured part ſimilar to the correſponding ſound limb; which, for the purpoſe of a more attentive examination, ſhould be placed as near to it as the conveniency of the operator will permit.

The neceſſity of attention to this part of the treatment will particularly appear from this, that when the fractured bones are not properly reduced at firſt, the limb muſt either remain always diſtorted, or be put right during a future ſtage of the cure, when it will neceſſarily be done with more pain to the patient, and more trouble and perplexity to the ſurgeon.

The

The bones being put right, our next object is to retain them as long as may be neceſſary in this ſituation. This we do with ſplints and bandages, and placing the limb in ſuch a ſtate of relaxation as will admit of its reſting with eaſe, and without being diſturbed, till the cure is completed. In treating of fractures of particular bones, the poſture in which they ſhould be placed, and the bandages beſt adapted for their retention, will be deſcribed. I may merely obſerve at preſent, that no bandage ſhould be more tightly applied than merely to retain the bones in their ſituation; and that this may, for the moſt part, be eaſily done, if the limb is kept in a relaxed poſture.

The time required for the firm reunion of fractured bones depends upon various circumſtances: Upon the ſize of the bone, and the weight that it has to ſupport; on the age and habit of body of the patient; and on the cure having proceeded with more or leſs interruption, from the limb having been kept more or leſs ſteadily in

its ſituation, as well as from the attending ſymptoms of ſwelling, pain, and inflammation, having been mild or ſevere. In a healthy middle-aged patient, where no untoward ſymptoms have occurred, and when the injured parts have been retained exactly in their ſituation, a cure of a fractured femur, or of the bones of the leg, will be accompliſhed in two months; of the humerus and bones of the forearm, in ſix weeks; of the clavicles, ribs and bones of the fingers and toes, hands and feet, in three weeks. In infancy and childhood, fractures in all theſe parts heal more quickly, while in old age this uniting proceſs goes on more ſlowly, and therefore requires more time to accompliſh.

In ſimple fractures, to which theſe general obſervations more particularly apply, the pain, tenſion, and other ſymptoms, are in general moderate, and uſually ſubſide entirely in the courſe of a few days, if the bones are properly retained in their ſituation; but in ſome caſes, inſtead of diminiſhing, they become daily more

more violent, ſo as to be productive of much diſtreſs to the patient, as well as trouble and embarraſſment to the practitioner.

When the muſcles and other ſoft parts of the limb have not been much contuſed, no remedy ſhould be adviſed merely with a view to the prevention either of tenſion or pain: But when much violence has been done to the limb, theſe ſymptoms ſhould be guarded againſt by the early uſe of aſtringent applications, ſuch as ſolutions of ſaccharum ſaturni, of crude ſal ammoniac, and ſpiritus Mindereri; and when theſe fail, by a free application of leeches over the injured parts. Indeed, the practice of taking away blood by leeches proves in every inſtance ſo highly uſeful, that I always adviſe it when the tenſion is conſiderable, or whenever the pain continues ſevere after the bones have been replaced. In every fracture, inflammation is the ſymptom which, in the firſt place, we have moſt reaſon to dread; and as nothing tends with ſuch certainty to

prevent or remove it as local blood-letting, it ſhould never be omitted at firſt when the ſurrounding ſoft parts are much injured: Nor ſhould it afterwards be delayed when it appears to be neceſſary; for this remedy proves always moſt effectual when employed early.

Beſides the immediate advantage of relieving the pain in the injured part, nothing prevents with ſuch certainty the troubleſome conſequences of contuſion in caſes of fracture, as the early application of leeches. Of theſe conſequences, the moſt remarkable are, deep-ſeated abſceſſes, which in ſome inſtances form within the cavity of the bone itſelf, and in others in the ſurrounding cellular ſubſtance; long-continued pains, reſembling rheumatiſm, ſtretching over the injured limb; a thickened enlarged ſtate of the perioſteum and other ſoft parts; a ſtiff contracted ſtate of the contiguous tendons; an exuberancy of callus; and an unwieldy ſtate of the whole member.

It is well known to every ſurgeon of experience, that all of theſe conſequences are apt to ſucceed to fractures accompanied with much contuſion; and nothing proves more perplexing to ſurgeons, or more diſtreſsful to patients; for when they are not ſoon removed, they are very apt to prove permanent; and for the moſt part this is laid to the charge of miſmanagement in the reduction of the fracture.

In many inſtances, theſe conſequences no doubt proceed from the extremities of the fractured bone not being properly replaced, or not retained with exactneſs afterwards: But they more frequently proceed from the inflammation that ſucceeds to contuſion. It is therefore evident, that early local blood-letting is in ſuch circumſtances moſt likely to prove uſeful. When ſwelling and pain in a fractured limb have continued long, the moſt effectual relief is obtained from frictions with emollient oils, and from tepid bathing in warm ſea-water, and in the waters

of Buxton, Bath, and Barreges. But in the early ſtages of fractures, nothing removes the pain with ſuch certainty as a plentiful diſcharge of blood from the injured parts.

We are ſometimes diſappointed in the cure of fractures, by the limbs remaining unſeemly from an over-growth of callus. This is not indeed a frequent occurrence, but every practitioner muſt have met with it: Being moſt apt to take place where the ſymptoms of inflammation have been ſevere, I have regularly ordered local bloodletting, for the prevention and removal of this exuberancy of callus, and commonly with much advantage; but, in ſome caſes, the tendency to form callus is ſo great, that it can ſcarcely be checked. The application of ardent ſpirits, and other aſtringents, is here ſuppoſed to prove uſeful; and I have in ſome inſtances derived advantage from continued gentle preſſure, applied by means of a thin plate of lead adapted to the form of the part, and retained with a proper bandage: But as neither

ther this nor any other remedy will prove ſucceſsful in every caſe, and as patients are apt to regret nothing ſo much as diſappointment in obtaining a complete cure of a fracture, our ſafeſt courſe, as ſoon as the callus begins to be luxuriant, is to acquaint the patient with the probable event; and he muſt be very unreaſonable indeed, if he afterwards repines at what the utmoſt care and attention could not prevent.

Among the conſequences that ſometimes reſult from fractures, there is one that merits more particular conſideration, namely, the difficulty of obtaining an union between the ends of the fractured bones, by which they remain looſe and detached long after they ſhould have been firmly united.

This may proceed from various cauſes: From conſtitutional diſeaſes, ſuch as rickets, ſcurvy, or lues venerea; from the ends of the fractured bones not being kept ſteadily in contact till completely united; from a portion of a muſcle, tendon, or ligament,

gament, falling between the ends of the fractured parts, ſo as to prevent them from being placed in contact; and in ſome, from a bone being broken in different parts, and the intermediate detached pieces being ſo ſmall as to prevent them from adhering, even when kept in cloſe contact.

It has been obſerved, too, that a ſtate of pregnancy proves inimical to the recovery of fractured bones. This has not indeed fallen within my obſervation; but it appears to be the general opinion of practitioners, and different inſtances of it are upon record.

When this want of union proceeds from any general diſeaſe of the ſyſtem, this diſeaſe muſt be removed by the remedies that experience has ſhewn to prove moſt effectual; for no attention on the part of the ſurgeon will be of any avail till this is accompliſhed; and as much miſchief is often prevented by an early application of remedies, they ſhould always be adviſed as ſoon as the cauſe is found to exiſt.

exiſt. It would even be a prudent precaution, where a patient at the time of receiving a fracture is known to labour under any conſtitutional diſeaſe, to adviſe an immediate application of remedies; by which means cures might be often quickly accompliſhed, which otherwiſe are protracted to a great length.

When a cure is interrupted by the fractured ends of bones not being kept in their ſituation, they ſhould be replaced and retained with as much accuracy as poſſible; and when the injury is ſtill recent, often, indeed, for the ſpace of two or three weeks, a perfect union may thus be accompliſhed.

But where fractured bones have remained for any conſiderable length of time diſunited, the oſſeous matter by which they ſhould have been knit together becomes hard, ſmooth, and totally unfit for the purpoſe, inſomuch that no advantage could be derived from their being replaced. Of this I have met with various inſtances, where the ends of the fractured

fractured bones were become perfectly ſmooth, and moved on each other with nearly the ſame eaſe and freedom as the bones of any of the joints.

In this ſituation, when the inconvenience which it excites is inconſiderable, the patient ſhould be adviſed to ſubmit to it, particularly in fractures of the ſmall bones, ſuch as thoſe of the fingers and toes, the bones of the metacarpus and metatarſus, the clavicles, and ribs, rather than to any operation for effecting a cure; but in the large bones of the extremities, where much firmneſs is required, and where this kind of injury deſtroys the uſe of the limb, as we may be able by an operation to reſtore it, we ought perhaps in every inſtance to propoſe it. By making an inciſion through the ſurrounding ſoft parts, ſo as to lay the ends of the bones bare, and removing a ſmall portion of each of them, either with a common ſaw, or with the head of a trepan, we reduce them to the ſtate of a recent fracture; when, by taking care to retain them in a proper ſituation,

tion, we may in due time accompliſh a cure.

The operation is no doubt painful and tedious; for the inciſion muſt be extenſive, in order to admit of a free application of the inſtruments; and it requires to be conducted with caution, that the large bloodveſſels of the limb may be avoided: But it may be done with perfect ſafety by any perſon accuſtomed to the operative part of ſurgery *.

Nor ſhould we be deterred from propoſing this method of cure, from any apprehenſion about the vacancy that may be produced by the removal of the ends of the bones: For if the limb is kept ſteadily in its ſituation, and if the conſtitution is healthy, nature will not probably fail in ſupplying the deficiency. Thus, many inſtances are upon record, even of entire bones being regenerated; and, in a leſſer degree, the powers of nature on this point muſt have

* Vide White's Caſes in Surgery, where two inſtances of this are recorded.

have fallen within the obſervation of every practitioner.

A bone is often broken in different parts, and a cure notwithſtanding obtained: But when the detached parts are ſo ſmall that the circulation will not probably be kept up in them, as they will thus be rendered incapable of furniſhing the ſecretion by which their reunion ſhould be accompliſhed, it would be better to remove them at once, than to impede the cure by any attempt to ſave them. Accordingly, in all compound fractures, where the injured bone is already laid bare, it is the beſt practice to remove all ſuch detached portions as might not probably unite with the remaining parts of the bone. But in ſimple fractures, where the ſkin remains entire, as we cannot judge with ſuch certainty of the nature and extent of the injury, nor of the probability of our being able to preſerve the looſe portions of bone, we ſhould endeavour, in the firſt place, to accompliſh a cure in the eaſieſt manner, by placing the parts in ſuch a poſition as will moſt readi-

ly

ly admit of their reunion: But when this does not ſucceed, when the ends of the bone remain looſe long after they ſhould have been united, and if one or more detached pieces are diſcovered, theſe are to be conſidered as extraneous bodies, and ought accordingly to be removed, either with the fingers or forceps, at an opening made through the ſoft parts for this purpoſe.

Experience enables me to recommend this practice with confidence. I have met with various caſes in which cures were judged to be impracticable, from no union being formed between the ends of bones that had been long fractured, and in which I proved ſucceſsful at laſt, by the removal of ſome looſe fragments.

But the moſt perplexing cauſe of failure, in the treatment of fractured bones, is a portion of a muſcle, ligament, or ſome other ſoft part paſſing between them. We judge that this is the caſe, when the pain and tenſion of the injured part have been more ſevere than uſual from the firſt; when

when particular movements of the limb occaſion ſevere pain and twitchings of the muſcles that ſerve to move it; and when the ends of the fractured bone do not unite at the uſual time.

As ſoon as there is reaſon to think that the cure is prevented by this cauſe, we ſhould endeavour to remove the portion of interpoſing membrane or muſcle, by putting the limb into every variety of poſture. But when this does not ſucceed, as may ſometimes be the caſe, and when the bones ſtill remain looſe long after the uſual period, we ought, without further heſitation, to make an inciſion upon the fractured part. When the injury has not been of long duration, a cure will be accompliſhed merely by bringing the ends of the fractured bone into contact; but when this meaſure has been long delayed, and when the oſſeous matter poured out by the fractured extremities of the bone has become hard, a ſmall part of it ſhould be removed either with a ſaw or ſome ſharp inſtrument, ſo as to convert the injury once more

more into the ſtate of a recent fracture; otherwiſe no advantage will be gained by the operation.

Beſides theſe cauſes that I have mentioned, which tend to impede the cure of fractures, it may not be improper to remark, that the effuſion of much blood round the injured bone, is very apt to do harm. In caſes of ſimple fracture, the larger bloodveſſels are ſeldom injured; and blood effuſed from ſmall arteries is for the moſt part ſoon abſorbed, and no bad conſequences enſue from it. But inſtances ſometimes occur, even in ſimple fractures, of large bloodveſſels being cut by the ſharp ſpiculæ of the bone. When the quantity of blood thrown out is conſiderable, the tumefaction of the limb becomes ſo great, that it is neceſſary to lay it open in order to ſecure the injured veſſel with a ligature: But where the ſwelling does not arrive at any alarming height, we rather truſt to the natural contractility of the artery, for ſtopping the hemorrhagy, and to the powers of the abſorbents, for removing

the blood already effuſed. In ſome ſuch caſes, where blood has remained long in contact with a fractured bone, the power of forming callus appears to have been deſtroyed by it; the perioſteum ſeparates for a conſiderable ſpace from each end of the bone; and on laying the parts open, no union is found to have taken place; the ſpiculæ produced by the fracture remain equally ſharp as at firſt; and, for the moſt part, a thin fetid ſanies is diſcharged from the ſore.

In this ſituation, a cure will not be obtained till thoſe parts of the bone which have been denuded of the perioſteum have exfoliated; and, as exfoliation is in general a tedious proceſs, I would rather adviſe the removal of the denuded bone with a ſaw; by which a more expeditious and more certain cure would be obtained.

Having premiſed theſe general obſervations, we proceed to the conſideration of fractures of particular bones.

SEC-

SECTION II.

Of Fractures of the Nose.

THE arch formed by the bones of the nose, prevents them from being so frequently fractured as they otherwise would be. They are necessarily, however, liable to every variety of fracture when exposed to much violence.

Besides the usual symptoms of fractures, injuries of this kind in the bones of the nose are apt to impede respiration; they hurt the speech and sense of smelling; polypi and tedious ulcers sometimes ensue from them; and they are more hazardous than fractures of other bones, from their contiguity to the brain. These fractures, therefore, require very accurate attention.

When we have aſcertained the nature and extent of the fracture, our next object is to replace, with as much accuracy as poſſible, ſuch parts of the bones as are diſplaced. When any part of them has been raiſed above the level of the reſt, it muſt be preſſed into its ſituation with the fingers; while ſuch parts of them as may have been forced into either of the noſtrils, muſt be elevated with the end of a narrow ſpatula, or any other inſtrument of a ſimilar form. Any portion of bone that is quite looſe, and nearly ſeparated from the reſt, ſhould be removed immediately, whether it be raiſed up or forced into the noſtril; but whatever adheres firmly to the remaining portion of bone ſhould be replaced.

If the bones are properly replaced, they will for the moſt part remain in their ſituation without aſſiſtance. If the ſoft parts have been injured, they muſt be dreſſed in the uſual way; and whether they are hurt or not, we ſhould endeavour to prevent inflammation by the uſe of ſaturnine applications,

plications, and by local blood-letting when the violence of ſymptoms ſeems to require it.

But when the parts that have been replaced do not remain firm in their ſituation, ſomething muſt be done to retain them. If they fall into the noſtrils, we ſucceed beſt by the introduction of tubes of ſuch a ſize into them, as may preſerve the fractured bones in their ſituation. The form and ſize of theſe tubes are delineated in Plate XXX. fig. 2. If the tubes are covered with ſoft lint, ſpread with any emollient ointment, they may be kept in the noſtrils as long as is neceſſary: While, on the contrary, if any part of the bone is raiſed above the reſt, it muſt be kept down by a proper application of a double-headed roller. If the teguments are injured, the ſore muſt be firſt dreſſed; care being taken in doing it to prevent deformity as much as poſſible: A compreſs of ſoft old linen muſt be next applied; and over the whole an equal preſſure with the bandage I have juſt mentioned.

In this manner a cure may be obtained of almoſt every injury of this part, unleſs the bones have been ſo much ſhattered, that their reunion cannot be accompliſhed: In which event, all that art can do is to extract the detached pieces, and to co-operate as much as poſſible with nature in healing the remaining ſore.

SEC-

SECTION III.

Of Fractures of the Bones of the Face.

WHEN treating of fractures of the ſkull, in Chapter X., thoſe of the upper part of the face were conſidered. At preſent, therefore, I have only a few obſervations to offer on fractures of the ſuperior maxillary and cheek bones, being thoſe which form the moſt prominent parts of the ſides of the face.

The vicinity of thoſe bones to the eyes and noſe, and the ſituation of the antrum maxillare, make fractures in this part highly important. When fractures ſtretch toward the eyes, they are apt to induce ſevere degrees of inflammation; and when they penetrate the antrum, they not only prove tedious, but commonly occaſion

much deformity: For when the anterior part of that cavity is laid open, and any portion of the bone removed, the face becomes flat, and the teguments puckered, notwithſtanding all that can be done to prevent it.

In all ſuch injuries, therefore, we ſhould with the greateſt care replace any portion of bone that may be fractured, ſo as to favour its reunion with the reſt; and any wound that accompanies the fracture, ſhould be dreſſed with much attention, that deformity, as far as poſſible, may be prevented.

After the bones are replaced, which may be done with the fingers where there is no wound, and with forceps or a narrow ſpatula when the parts are laid open, a piece of adheſive plaſter will anſwer better than any bandage for retaining the dreſſings. Blood-letting, and an antiphlogiſtic regimen, muſt be adviſed to obviate inflammation of the eye or contiguous parts, which otherwiſe might enſue. The remaining part of the cure, namely, the reunion of the

the fractured parts of the bone, muſt be left to nature.

When a fracture penetrates the antrum maxillare, the matter which collects in that cavity cannot be properly evacuated from any opening that may take place on the prominent part of the cheek. In conſequence of this, I have known ſinuous ulcers formed that have continued open for a great number of years. They can only be healed by giving a free vent to the matter, by an opening made in the moſt depending part of the cavity, in the manner I have adviſed in Chap. XIV. Sect. V.

SEC-

SECTION IV.

Of Fractures of the inferior Maxillary Bones.

ALTHOUGH the bones of the under jaws are very ſtrong and compact, yet fractures of one, or even of both, are not unfrequent. This ſeems to ariſe from blows and other injuries to which theſe bones are expoſed, being moſt apt to fall upon their anterior flat ſurfaces, where they are leſs capable of reſiſting violence than in any other part.

We judge of the exiſtence of a fracture in the jaw, by the deformity that it occaſions; by the crackling of the bone when handled; by inability to move the jaw; by the violence of the injury, and degree of pain with which it is accompanied.—

panied.—When both jaws are broken, the injury becomes obvious; as in this caſe a conſiderable ſeparation takes place at the fractured part: But even where one bone only is fractured, it may always with due attention be diſcovered.

The ſite of the fracture being aſcertained, our next object is to replace the bones with as much care as poſſible: This we do by placing the patient in a proper light, having his head firmly ſecured, and the fingers of one hand preſſing upon the inſide of the jaw, while the other hand is employed externally in removing any perceptible inequality of the bone. One of the teeth is commonly ſeated in the courſe of the fracture; and in this ſituation acting as an extraneous body, and thus tending to retard the cure, it ſhould be a general rule to take it out immediately: But when any of the teeth not ſeated in the courſe of the fracture, are forced out of their ſockets, it may be right almoſt in every inſtance to replace them, and to endeavour to fix them,

them, by tying them to the contiguous firm teeth.

This being done, our next object is to retain the fractured bones in their ſituation till they are firmly reunited. For this purpoſe, a variety of ſplints have been invented, both of paſteboard and other materials; but as a compreſs and bandage, either of ſoft old linen or cotton, anſwers the purpoſe with equal certainty, and as it ſits with much more eaſe to the patient, it ſhould always be preferred. The parts being kept firm by an aſſiſtant, a thick compreſs ſhould be laid over the chin, and be made to extend from ear to ear along each jaw; and over the whole a four-headed roller ſhould be applied in the manner I ſhall mention when treating of bandages. In uſing this bandage, it ſhould not be made ſo tight as to give much uneaſineſs, or to endanger the circulation, at the ſame time that it ſhould be applied in ſuch a manner as

to

to keep the fractured parts of the bone in close contact.

During the cure, the patient should be kept perfectly quiet. He should be fed entirely on spoon-meat. He should be enjoined neither to speak or laugh, nor to use his jaws in any manner of way. To prevent the bones from being displaced, which is apt to happen from frequent inspection, the bandage should be applied with such attention, that there may be no occasion to move it often. In compound fractures of this part, there is indeed a necessity for moving the bandage daily, as the sore cannot otherwise be dressed. It should always be done, however, with the utmost attention, an assistant taking care to support the parts with his hands during the whole time.

The management of a fracture of one or both jaw-bones is exactly similar; only where both bones are broken, still more attention is required than when one only is fractured. In a fracture of one of the bones,

bones, the patient may be allowed to eat ſoft meats, and to ſpeak with freedom, in the ſpace of three weeks: But where both bones have ſuffered, this ſhould not be permitted till five or ſix weeks have elapſed.

SEC-

SECTION V.

Of Fractures of the Clavicles and Ribs.

THE clavicles and ribs are more liable to fractures than any other bones. This proceeds, not only from the ſlender ſtructure of theſe bones, but from the poſition in which they are placed, with their flat ſides expoſed to every injury that may be applied to them.

A fracture of the clavicle is in general eaſily diſtinguiſhed. On the correſponding arm being ſmartly moved, a grating noiſe is produced by the ends of the bone rubbing againſt each other; the ends of the fractured part readily yield to preſſure; and, in general, the end of the bone connected with the humerus, is pulled to ſome diſtance from the other by the weight

weight of the arm. The motion of the humerus is impeded, and ſome degree of ſwelling, accompanied with more or leſs pain, takes place over the injured part.

In almoſt every inſtance of a fractured clavicle, the end connected with the ſternum is higher than the other, which has ſuggeſted an idea that has very univerſally prevailed in the method of cure. The height of this part of the bone is ſuppoſed to proceed from its having ſtarted or riſen out of its natural ſituation: In the reduction, therefore, of the fracture, much pains is commonly taken to preſs it down, and very tight bandages are employed to prevent it from riſing during the cure. It will, however, be found, that this part of the bone riſes very little out of its natural ſituation, and that the appearance of its doing ſo proceeds almoſt entirely from the other end of the bone being dragged down by the cauſe I have mentioned, namely, by the weight of the arm. At any rate, no advantage is obtained from this practice: For a force that would be neceſſary for preſſing

preſſing down the end of the bone, cannot be applied without the effect of cutting the teguments, by preſſing them againſt that part of it that is ſuppoſed to be raiſed; while our purpoſe is fully anſwered by raiſing the arm, and ſupporting it at a proper height. The depreſſed portion of the fractured clavicle is thus raiſed and brought into contact with the upper part of it. In ſome caſes, indeed, of oblique fractures, it may be impoſſible to bring the ends of the bone in every point exactly oppoſite to each other: But this may be always ſo far accompliſhed as to enable us to avoid deformity, and to render the bone ſufficiently ſtrong.

When the ends of the bone are brought into contact, our object is to retain them in this ſituation till they are united; and, as I have obſerved above, this can only be done by affording a proper ſupport to the arm.

The arm is uſually ſupported by a ſling hung round the neck, adapted to the length of the arm, and every where equal-

ly applied to it. But the leather caſe repreſented in Plate XCIX. fig. 1. anſwers the purpoſe with more eaſe and neatneſs. It ſupports the fore-arm and elbow-joint more equally and more ſecurely: This laſt, I may remark, is a point of no ſmall importance; for if the elbow is allowed to drop, the humerus and ſcapula will both fall down, by which the ends of the fractured clavicle will again be ſeparated.

We are commonly directed, in the cure of fractures of this bone, to have the ſhoulders drawn back and the head raiſed; and inſtruments are deſcribed for effecting theſe purpoſes. No general rule, however, of this kind can be given: For in ſome caſes the fractured parts of the bone are kept exactly together when the head is bent down upon the breaſt; while in others, it is better accompliſhed when the head and ſhoulders are raiſed.

In other points, fractures of the clavicle muſt be treated like ſimilar injuries in other parts of the body. When ſevere pain takes place, bleeding with leeches becomes

comes proper; but in general, the ſymptoms ariſing from fractures of this bone are of ſo little importance, that the common ſaturnine applications prove ſufficient. When the fracture is accompanied with a wound, any ſplinters of bone that may be diſcovered muſt be removed, and the wound itſelf dreſſed in the uſual way. It is proper, however, to remark, from the vicinity of the ſubclavian artery, that the removal of any portion of the clavicle may be attended with danger, and ought therefore to be managed with caution.

When the ends of the fractured part are properly ſupported, they will in general be firmly united in the ſpace of a fortnight; but the correſponding arm ſhould never be uſed with freedom till the end of the fourth or fifth week.

We diſcover fractures of the ribs by the ſeat of the pain, and by preſſure with the fingers. For the moſt part, the attending ſymptoms are moderate; the pain induced by the fracture is inconſiderable, no fever occurs, and the patient ſoon gets well:

But in ſome inſtances the pain is ſevere from the firſt; the breathing becomes difficult, attended with cough, and perhaps a ſpitting of blood; and the pulſe is quick, full, and ſometimes oppreſſed.

It will readily be underſtood, that a fractured rib cannot of itſelf induce any of theſe ſymptoms: But in ſome inſtances the ribs are not only fractured, but puſhed inwards, by which the pleura and lungs are not only compreſſed but lacerated; from which we may eaſily perceive, how pain, oppreſſed breathing, and fever, ſhould be induced; and from which alſo we may account for the emphyſematous ſwellings deſcribed in Chapter XXI. Section V.

In all caſes of fractured ribs, it is a ſafe and proper practice to diſcharge a quantity of blood proportioned to the ſtrength of the patient. If any inequality is diſcovered, by one end of the rib having riſen above the other, we ſhould endeavour by moderate equal preſſure to replace it; and to prevent it from riſing, a broad leather belt ſhould be applied and drawn as tight

as the patient can eaſily bear it. When the belt is properly lined, either with quilted cotton or flannel, it ſits with eaſe even when tolerably tight; and it ought to be continued for ſeveral weeks after the accident.

Even where the ſymptoms have at firſt been ſevere, they commonly ſubſide upon the patient being freely bled and kept quiet and on a low regimen: But where the oppreſſed breathing is kept up by air eſcaping from a puncture in the ſurface of the lungs, or by blood diſcharged from a ruptured artery into the cavity of the cheſt, or when the pain is prevented from ſubſiding by the fractured rib being forced in upon the pleura; it becomes neceſſary to make an opening with a ſcalpel. Where a portion of rib is merely forced inwards, the opening ſhould be made directly upon the injured part; and on the rib being laid bare, the depreſſed part of it ſhould be raiſed, either with the fingers, forceps, or a ſpatula. When the ſymptoms proceed from air or

blood collected in the cavity of the cheſt, an opening ſhould be made to diſcharge them, in the manner that I have mentioned in Chapter XXI. Sect. III. and V.

Fractures of the ribs ſhould in every inſtance be treated with attention; but particularly where a tendency takes place to phthiſis pulmonalis, when the irritation produced by a fractured rib is very apt to do harm.

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SECTION VI.

Of Fractures of the Sternum.

THE ſupport which the ſternum receives from the ribs, and the degree of elaſticity of which it is poſſeſſed, render it leſs liable than it otherwiſe would be to be hurt by external violence. It muſt neceſſarily, however, be injured by great degrees of force. In ſome caſes it is fractured without being diſplaced: In others, it is not only broken, but at the ſame time beat in upon the pleura.

A ſimple fracture of the ſternum is to be conſidered in the ſame light with ſimilar injuries done to the ribs, and to be treated in the ſame manner. But more danger is apt to enſue from any portion of this bone being forced into the cheſt, from the vici-

nity of the large bloodveſſels of the breaſt, while the ſymptoms with which it is accompanied are nearly the ſame; namely, pain in the injured part, cough, oppreſſed breathing, a quick and ſometimes an oppreſſed pulſe.

By ſome we are told, that the depreſſed portion of bone may be raiſed by deſiring the patient to make deep inſpirations; by placing a barrel or a drum under his back, and keeping him lying for ſome time in this poſture; and by the application of adheſive plaſters over the correſponding teguments; when, by elevating the ſoft parts, the bone beneath, it is ſaid, may frequently be raiſed along with them.

It is not poſſible, however, to ſuppoſe, that much advantage is to be derived from any of theſe means: They may more likely, indeed, do harm; nor would I have mentioned them here, had it not been with a view to caution the younger part of the profeſſion, who, finding theſe modes of practice recommended by all the older writers, might

have

have been induced to adopt them without weighing their import. As the ſkin is no where very intimately connected with the bone beneath, it is not probable that any portion of depreſſed bone will ever be raiſed by the external application of adheſive plaſters; while, by adviſing deep inſpirations, or laying the patient upon his back over a convex body, we would often do harm, by forcibly puſhing the lungs againſt the depreſſed portion of bone.

When it therefore happens, that the pain, cough, oppreſſed breathing, and other ſymptoms, do not yield to blood-letting and other parts of an antiphlogiſtic courſe, ſome other method of cure ſhould be attempted. An inciſion ſhould be made upon the injured part, of a length ſufficient to admit of a free examination of the bone; when the depreſſed piece may be raiſed with a levator, if the opening will admit an inſtrument; or when the opening in the bone is not ſufficiently large for this, a perforation may be made with the trepan, in the manner I have adviſed in

Chapter

Chapter X. in ſimilar injuries done to the ſkull.

I know that many will judge this to be hazardous; but when a patient is in danger, either from a portion of depreſſed rib or of the ſternum, and which cannot otherwiſe be raiſed, I would never heſitate in adviſing it. If the operation is performed with caution, the bone may be raiſed with ſafety; and this being done, the ſore muſt be treated in the uſual way. By this being neglected, either from timidity on the part of the operator, or from any other cauſe, many have died of phthiſis pulmonalis, who otherwiſe might have been ſaved.

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SECTION VII.

Of Fractures of the Vertebræ, Os Sacrum, Coccyx, and Ossa Innominata.

FRACTURES of the vertebræ may be produced by falls and blows; but we meet with them more frequently from gun-ſhot wounds, than from any other cauſe.

For the moſt part, they terminate fatally: For although many have ſurvived ſuch fractures a great length of time, yet they generally linger and die of the conſequences. The ſpinous and oblique proceſſes of the vertebræ may indeed be broken without immediate danger; but very commonly the force by which this is effected, gives ſuch a ſhock to the ſpinal marrow, as at laſt terminates in the death of the patient: And

And a fracture that extends through the body of a vertebra, will probably, in every inſtance, prove fatal.

We judge of the exiſtence of this fracture, by external examination; by the force with which it was effected; by the ſeverity of the pain; and by the parts lying below the injured vertebra becoming paralytic when the ſpinal marrow has been injured.

When any of the external parts of the vertebræ are looſe, we may in general replace them with our fingers; and, confining the patient as much as poſſible to one poſture, we may, by means of the napkin and ſcapulary bandage, retain them in their ſituation till they unite with the reſt of the bone.

Where this cannot be done, a patient is in general left to his fate, as it is not ſuppoſed that we can with ſafety lay any of the vertebræ bare, for the purpoſe of replacing ſuch parts of them as may be deranged: But wherever the ſpinal marrow appears to be compreſſed, and where there

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is reaſon to think that the compreſſion is produced by the depreſſion of a portion of bone, as we know from experience that every ſuch caſe will terminate fatally if the cauſe of compreſſion be not removed, it would ſurely be better to endeavour to raiſe it, than leave the patient to certain miſery and death. By laying the injured parts freely open, we may be enabled to raiſe that portion of bone by which the compreſſion is produced; while, in ſuch circumſtances, it cannot add to the hazard of the patient, even allowing the attempt to prove abortive.

In a caſe where ſymptoms of paralyſis were induced by a muſket-bullet lodged in the ſubſtance of one of the vertebræ, a complete recovery was obtained by extracting the bullet. A portion of depreſſed bone might often be removed with equal eaſe and ſafety; and there is reaſon to ſuppoſe that ſimilar effects would often reſult from it.

In fractures of the os ſacrum, the method of treatment muſt be nearly ſimilar to

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what I have adviſed in fractures of the vertebræ; only, where the injury is ſeated near to the under part of the bone, as well as in fractures of the coccyx, when any part of it is preſſed inward, we may in ſome caſes be able to replace it, by puſhing it out with the finger of one hand introduced into the anus, while we co-operate outwardly with the other.

Where any of the oſſa innominata are broken, if the injury is deeply ſeated, the patient ought to be placed in that poſture in which he finds himſelf in greateſt eaſe, and confined as much as poſſible to this ſituation, till the bones have time to unite. Blood-letting, and an attentive regimen, ſuited to his ſtrength and to the violence of the ſymptoms, may prevent the inflammation that uſually ſupervenes from becoming ſevere.

In more external fractures of theſe bones, we are often enabled to replace ſuch parts of them as have been forced out of their ſituation, and with the aſſiſtance of a proper bandage, we may alſo be able

to

to retain them till a cure is completed. I have now seen different instances of a considerable portion of the ileum being fractured and separated from the rest, and of a cure being accomplished, by replacing the detached parts, and retaining them with a broad roller passed several times round the pelvis and upper part of the thigh.

With respect to the application of this bandage, no particular directions can be given: It must depend entirely on the judgment of the practitioner; who will apply it in the way that he thinks will make it answer the purpose of fixing the bones in the securest manner.

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SECTION VIII.

Of Fractures of the Scapula.

THE ſcapula, from its ſituation, is not ſo liable to be fractured as other bones; but every practitioner muſt have met with it. It may be fractured either in the thin plate, of which it is moſtly compoſed; or in one or other of its proceſſes.

As the motion of the arm depends much on a ſound and entire ſtate of the ſcapula, and as fractures of any part of it are difficult to cure, they very commonly produce a ſtiff unwieldy ſtate of the correſponding arm, which in ſome degree often continues during the life of the patient.

Fractures of this bone are diſcovered by the ſeat of the pain; by the violence of the

the injury; by manual examination; and by ſtiffneſs and immobility in the correſponding arm. We are told, that fractures of the ſcapula are apt to be accompanied with emphyſematous ſwellings; but they can only appear when a ſplinter of the bone is forced into the lungs: When this takes place, air will no doubt eſcape; and if it paſſes into the cellular ſubſtance, emphyſematous ſwellings will neceſſarily occur.

In fractures of the ſcapula, our firſt object is to replace the fractured parts of the bone with as much exactneſs as poſſible: In doing ſo, we are much aſſiſted by relaxing the muſcles of the injured part. By raiſing the head and ſhoulders we relax the muſcles of the back; and if, at the ſame time, the humerus is ſupported, the deltoid muſcle will be ſo much relaxed, that any fractured portion of the ſcapula will be more eaſily replaced. It is always however more difficult to retain the bones during the cure, than to replace them: For the detached portion being in general

ſmall, we can ſeldom retain it with a bandage. A proper application of a long roller is perhaps the beſt method of doing it; and in uſing this bandage, we ſhould ſtill take care to have the head and ſhoulders ſupported, and the arm ſuſpended, ſo as to keep all the muſcles of the injured part as much as poſſible relaxed.

As all fractures are apt to excite inflammation, I have elſewhere obſerved, that this ſymptom ſhould at all times be guarded againſt. No where is it more neceſſary to attend to this than in fractures of the ſcapula, where inflammation is particularly apt to proceed to an alarming height. Blood-letting ſhould therefore be freely practiſed; particularly local blood-letting with leeches, or cupping and ſcarifying; a remedy that I conſider as more effectual than any other for the removal of inflammation, wherever it is ſeated.

SECTION IX.

Of Fractures of the Humerus.

FRACTURES of this bone are eaſily diſcovered, as no part of it is thickly covered with ſoft parts: Oblique fractures become evident to the ſight, but even thoſe that are perfectly tranſverſe become immediately obvious on the ſlighteſt manual examination.

In the reduction of fractures of this bone, we do not find that much extenſion is required; but that it may be done with eaſe, the muſcles of the arm ſhould be put as much as poſſible into a ſtate of relaxation; this we do by moderately bending the elbow, while the limb is raiſed nearly to a horizontal direction, and not carried

ſo much forward as to put the latiſſimus dorſi, inſerted into the back-part of it, on the ſtretch, or too far back to ſtretch the pectoral muſcle.

The patient being properly placed, and the arm put in this ſituation, the ſurgeon will in general be able to replace the bones without any aſſiſtance; but when extenſion is neceſſary, it may be applied by one aſſiſtant graſping the arm between the fracture and joint of the ſhoulder, and another above the elbow.

In this manner the fractured parts of the bone are to be replaced; and with a view to ſecure the fractured parts in their ſituation, a firm ſplint, ſuch as is repreſented in Plate LXXXI. figs. 5. and 6. ſhould be placed on the outſide of the arm, and another along the inſide of it, each of them covered with ſoft flannel, to prevent them from galling the ſkin; and while theſe are ſecured by one aſſiſtant, and the fore-arm ſupported by another, a flannel roller ſhould be applied over the whole, of ſuch tightneſs as to ſupport the ends of the fractured

fractured bone, without interrupting the circulation of the limb.

The fore-arm ſhould be ſupported in a ſling, ſuch as is repreſented in Plate XCIX. fig. 1., and the patient may be either put to bed or allowed to ſit, as is moſt agreeable to himſelf. It may not, however, be improper to remark, that it anſwers better to have the arm in a hanging poſition than laid horizontally on a pillow; particularly in oblique fractures of this bone, in which the weight of the limb has a conſiderable effect in preventing the ends of the bone from over-lapping or paſſing each other. Even in bed, therefore, where there is any danger of this, the patient ſhould be placed in ſuch a manner that his arm may hang, inſtead of being laid in the uſual way upon a pillow. In tranſverſe fractures, this precaution is not ſo neceſſary, as the ends of the bone, if once replaced, ſerve in ſome meaſure to ſupport each other. But even in theſe, it is the beſt practice to ſupport the fore-arm in ſuch a manner that it may have ſome

effect in pulling the under part of the humerus gently downwards.

When no urgent ſymptom takes place, ſuch as much pain and ſwelling of the arm, the bandage ſhould not be moved for ſeveral days: But about the ſeventh or eighth day, it is proper in every fracture to remove all the coverings, in order to ſee whether the bone is perfectly in its place or not; for at this period, any accidental diſplacement may be eaſily put right, and a cautious inſpection may be made with ſafety.

I have adviſed a roller to be employed for fractures of this bone; and perhaps it is the only inſtance in fractures of the large bones of the extremities in which it ſhould be preferred to the twelve-tailed bandage. But whoever has uſed them both will find, that in ſimple fractures of the humerus, the roller is not only more eaſily applied than the other, but that it anſwers the purpoſe better.

Fractures of the humerus commonly heal more kindly than ſimilar injuries of any

any other bone; and when properly managed, they ſeldom leave either lameneſs or diſtortion of the arm. When no interruption occurs to the cure, either from ſevere pain, ſwelling, or inflammation, or from accident or miſmanagement, the bone will in general be firmly united in leſs than a month; but the limb ſhould not be uſed with freedom till ſix or ſeven weeks have elapſed.

SECTION X.

Of Fractures of the Bones of the Fore-Arm.

THE bones compoſing the fore-arm are two in number, the radius and ulna. Being much expoſed to injuries, they are very liable to fractures. When both bones are broken, the nature and ſeat of the injury at once become obvious; but when one bone only is fractured, eſpecially the radius, as the firmneſs of the ulna keeps it on the ſtretch, and prevents it from being diſplaced, we do not ſo eaſily perceive the injury: The ſeat of the pain points out the injured part; and when either of the bones is fractured, a grating noiſe will be heard if the ſurgeon graſps the limb firmly above and below this part, and endeavours to move it in different directions.

In

In this examination, it is of much importance to diſtinguiſh the direction of the fracture with as much exactneſs as poſſible, particularly if near to the wriſt; for upon this the chance of our making a perfect cure in a great meaſure depends; and in this ſituation, whether both bones or only one of them is broken, much attention is required to prevent the ſtiff uneaſy ſtate of the arm from continuing long after the bones are united: Patients indeed often complain of this, in ſome caſes during life; and I think it more frequently happens when the radius is broken by itſelf than when the ulna only is fractured, owing, I ſuppoſe, to the radius having a rotatory motion independent of the other, by which it is not ſo eaſily kept in its ſituation. And as there is nothing for which practitioners are more apt to be blamed than for thoſe inconveniencies that ſucceed to fractures, we ought, in every inſtance to be as much as poſſible on our guard againſt them.

On

On the ſeat of the injury being diſcovered, if any part of either of the bones is diſplaced, we ought, as ſoon as it can be done, to put it right. The patient being properly ſeated, and the muſcles of the arm relaxed by gently bending the joints of the wriſt and elbow, the fore-arm ſhould be extended to ſuch a degree, by one aſſiſtant graſping it above the fracture, and another below, as is juſt ſufficient to allow the ſurgeon to replace the bones. This being done, one of the ſplints repreſented in Plate LXXXI. fig. 3. 4. or 5. covered with ſoft flannel, and of a length to reach from the elbow to the tops of the fingers, and of ſuch a breadth as to incaſe rather more than one half of the arm and hand, ſhould be placed along the ulna. Another ſplint not quite ſo broad muſt be placed along the courſe of the radius; when both muſt be ſecured either with a flannel roller or a twelve-tailed bandage, with ſuch tightneſs as may prevent the bones from ſlipping out of their place, but without impeding the circulation, or exciting any degree

gree of pain. In all ſimple fractures of theſe bones, the twelve-tailed bandage, and ſimple roller, may be uſed with perhaps equal propriety.

In applying the ſplints, the palm of the hand ſhould be turned towards the breaſt, this being not only the moſt convenient poſture in which the arm can hang while in a ſling, but the beſt in which it can at all times be placed, even when the patient is in bed: for in this ſituation the palm of the hand can neither be turned up nor down; that is, it can neither be put into a prone nor a ſupine poſture, without giving that rotatory motion to the radius that I have mentioned, and which tends more than any other to diſplace any part of this bone that may be fractured. It ſhould therefore be avoided; and I know of no way in which it can with ſuch certainty be done, as ſecuring the arm with ſplints in the manner I have mentioned: It ſhould now be hung in the ſling repreſented in Plate XCIX. fig. 1. and allowed to remain in the leather caſe during the night,

night, or in any ſmall box of a ſimilar conſtruction, and of a ſize juſt ſufficient to receive the arm when placed upon its ſide, but without permitting it to turn either one way or another.

In ſpeaking of the ſplints, I have adviſed them to be of a ſufficient length for ſtretching along the whole courſe of the arm from the elbow to the top of the fingers. The under ſplint ought more eſpecially be of this length; for the arm not only reſts with more eaſe and equality upon a long ſplint, but it ſerves to cover the fingers, by which they are prevented more effectually than in any other manner from moving; a circumſtance of much importance in every fracture of the fore-arm: For when a free motion of the fingers is permitted, it not only tends to keep up inflammation and pain, but is often the cauſe of the bones being again diſplaced, when otherwiſe they might have been kept in contact

A partial diſlocation of the bones forming the joint of the wriſt, is not an unfre-

quent

quent concomitant of fractures of the radius; from a combination of which, there is always much risk of stiffness being left in the joint, and of a painful permanent swelling over the under part of the arm: With this the patient should always be made acquainted; for even under the best management, a dislocation of the wrist, accompanied with a fracture of the contiguous bones, commonly ends in this manner: For the method of reducing the dislocation, I must refer to the ensuing Chapter; and I have already pointed out, in the first Section of this Chapter, what I conceive to be the best method of preventing and removing inflammation; which I have there shewn to be the most frequent cause of that stiff immoveable state in which fractured limbs are often left.

The olecranon, or upper end of the ulna, is sometimes fractured without any injury being done to the rest of the bone; this part of the bone being particularly apt to suffer from falls and bruises upon the elbow.

In

In this caſe, in order to keep the fractured parts in contact, the fore-arm muſt be extended: And with a view to preſerve the arm in this ſituation, a long ſplint ſhould be laid along the fore-part of it, from the upper part of the humerus to the tops of the fingers; and this being ſecured with a roller, the arm ſhould be allowed to hang by the ſide, to which it ſhould be fixed with one or two ſtraps.

It is proper, however, to remark, that it ſhould not be long kept in this ſituation, otherwiſe a ſtiffneſs of the elbow-joint would enſue: With a view to the prevention of this, the bandage and ſplint ſhould be removed about the eighth or tenth day; when the fore-arm being for ſome time moved ſlowly backward and forward, and the joint rubbed with any emollient oil, the arm ſhould be again ſecured as before. A cautious and daily repetition of this, while it prevents a ſtiff joint, does not retard the cure.

SECTION XI.

Of Fractures of the Bones of the Wriſt, Hands, and Fingers.

THE bones of the wriſt being ſmall, round, and ſomewhat moveable, readily yield to any ordinary force that may be applied to them. On this account, they are ſeldom fractured, except by ſhot from fire-arms, or a heavy weight paſſing over them.

Theſe bones are ſo ſmall that when fractured, they are not eaſily retained *in ſitu*, and do not therefore unite ſo readily as bones of a larger ſize. For this reaſon, as well as from the contiguity of numerous ligaments and tendons, which gives riſe to high degrees of inflammation, a complete anchyloſis, or great ſtiffneſs of

of the joint, often ſucceeds. After replacing the bones, theſe conſequences are with moſt certainty guarded againſt, by a copious diſcharge of blood from the injured parts by means of leeches; and this being done, the arm and hand ſhould be well ſupported by a ſplint beneath, and another above, in the manner adviſed in the laſt ſection.

In fractures of the metacarpal bones, after being replaced with accuracy, a firm ſplint, either of timber or ſtrong paſteboard, ſhould be applied over the whole palm of the hand and inſide of the arm, from the ends of the fingers to the joint of the elbow, in order to keep the hand in a ſtate of extenſion, as the flexor muſcles of the fingers cannot be bent without altering the poſition of theſe bones: And that this may with certainty be done, the long ſplints mentioned above, ſecured with a ſimilar bandage, ſhould be applied over the whole.

Fractures of the bones of the fingers are frequent; but when properly treated, they

they readily unite, and the fingers become equally uſeful as before.

The beſt ſplint for a fractured finger is a piece of firm paſteboard fitted to it with accuracy, and ſoftened in water till it is eaſily moulded to the form of the part. The finger being ſtretched out and the bone replaced, this ſplint ſhould be applied along the whole length of it, and ſecured with a narrow roller. In order to prevent the injured parts from being diſturbed, a large ſplint, either of the ſame kind of paſteboard, or of a thin piece of wood glued upon leather, as is repreſented in Plate LXXXI. figs. 3, 4, 5, or 6, ſhould be applied over the inſide of the hand; and the fingers being ſtretched upon it, another roller ſhould be put over the whole, to ſecure the fingers and hand, ſo as entirely to prevent motion.

With a view to preſerve the motion of the finger-joints, the bandage and ſplints ſhould be removed about the tenth or twelfth day; when all he joints being frequently bent and extended, the whole

PLATE LXIX.

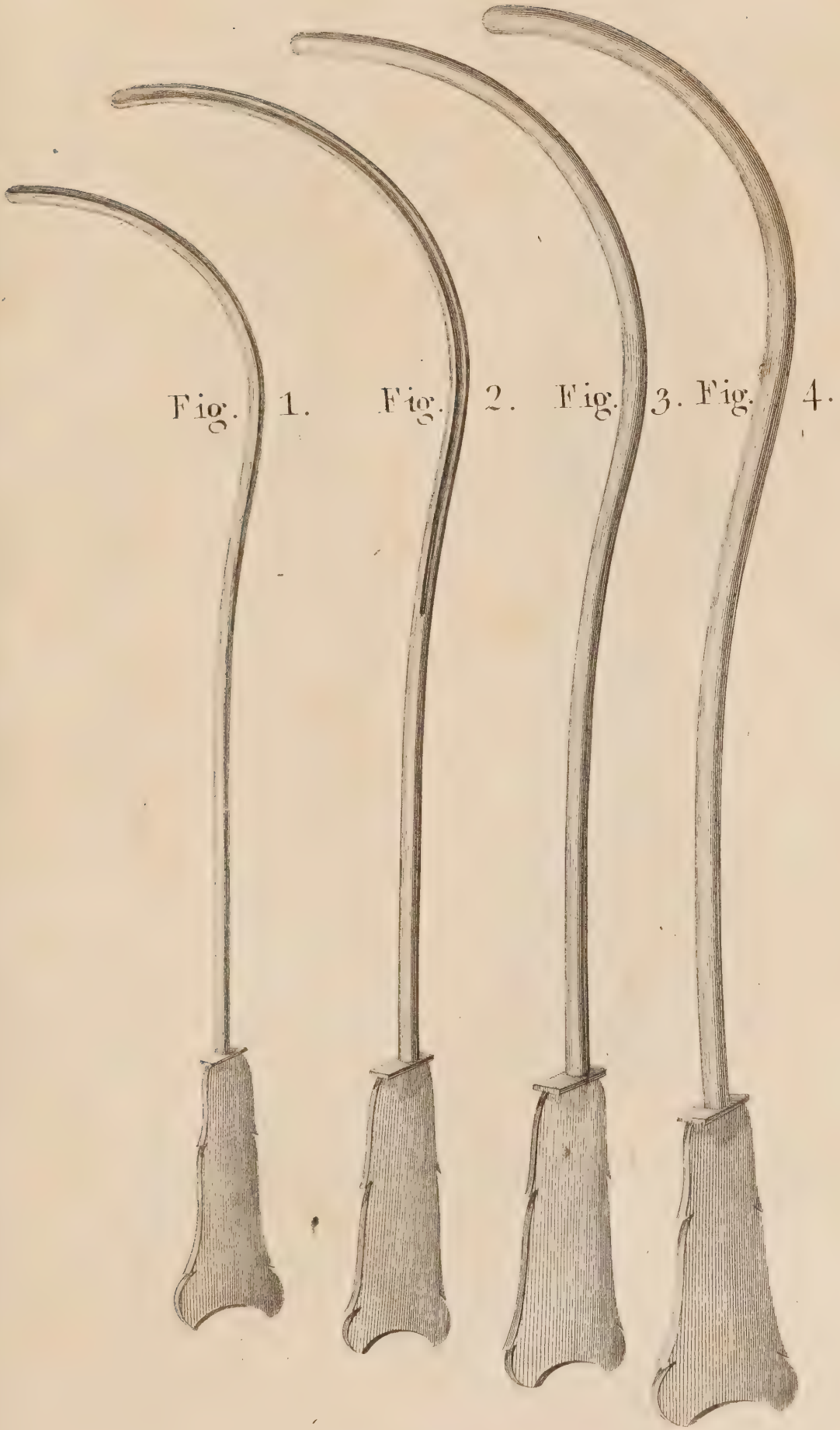


Fig. 1. Fig. 2. Fig. 3. Fig. 4.

PLATE LXX.

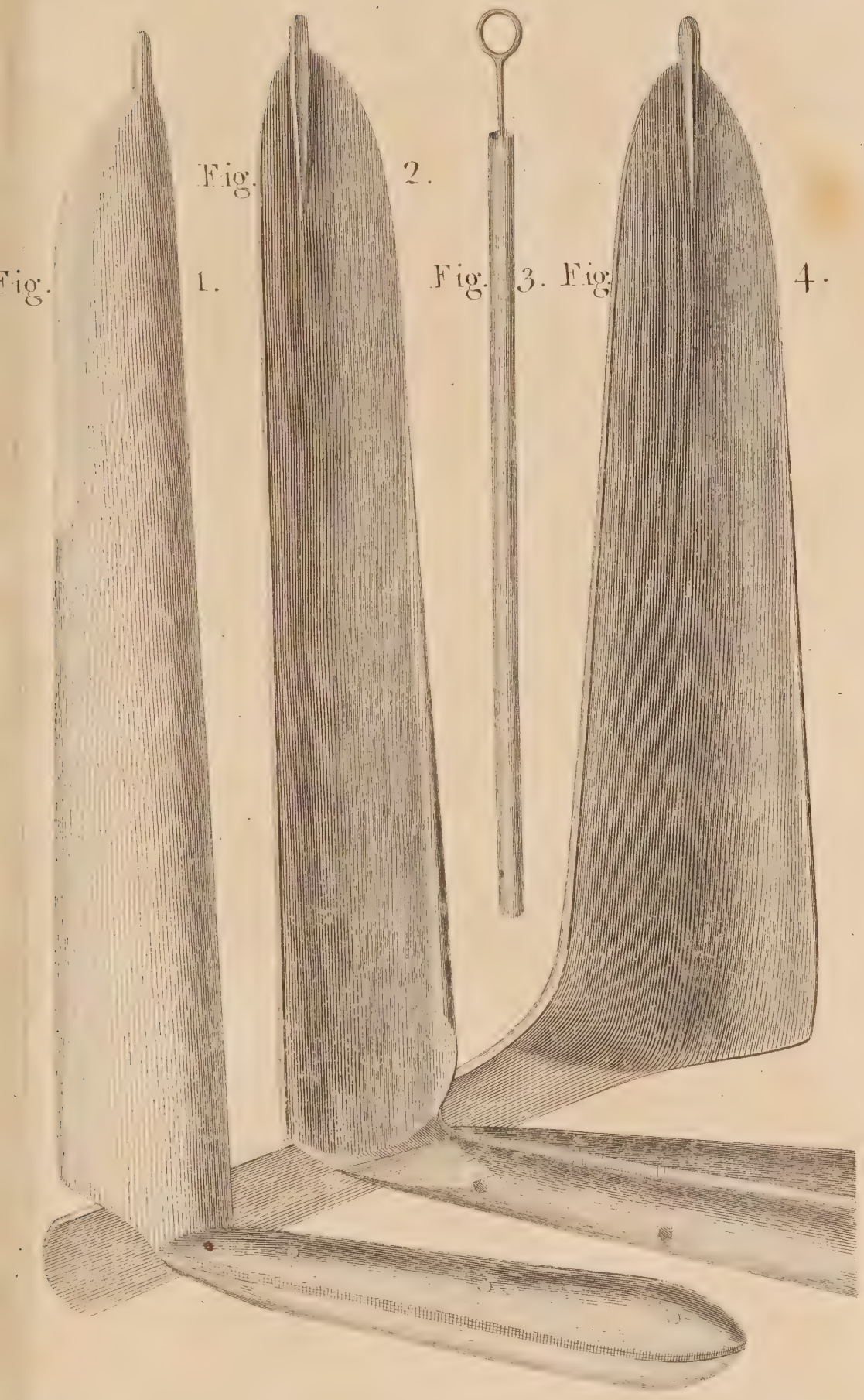


PLATE LXXI.

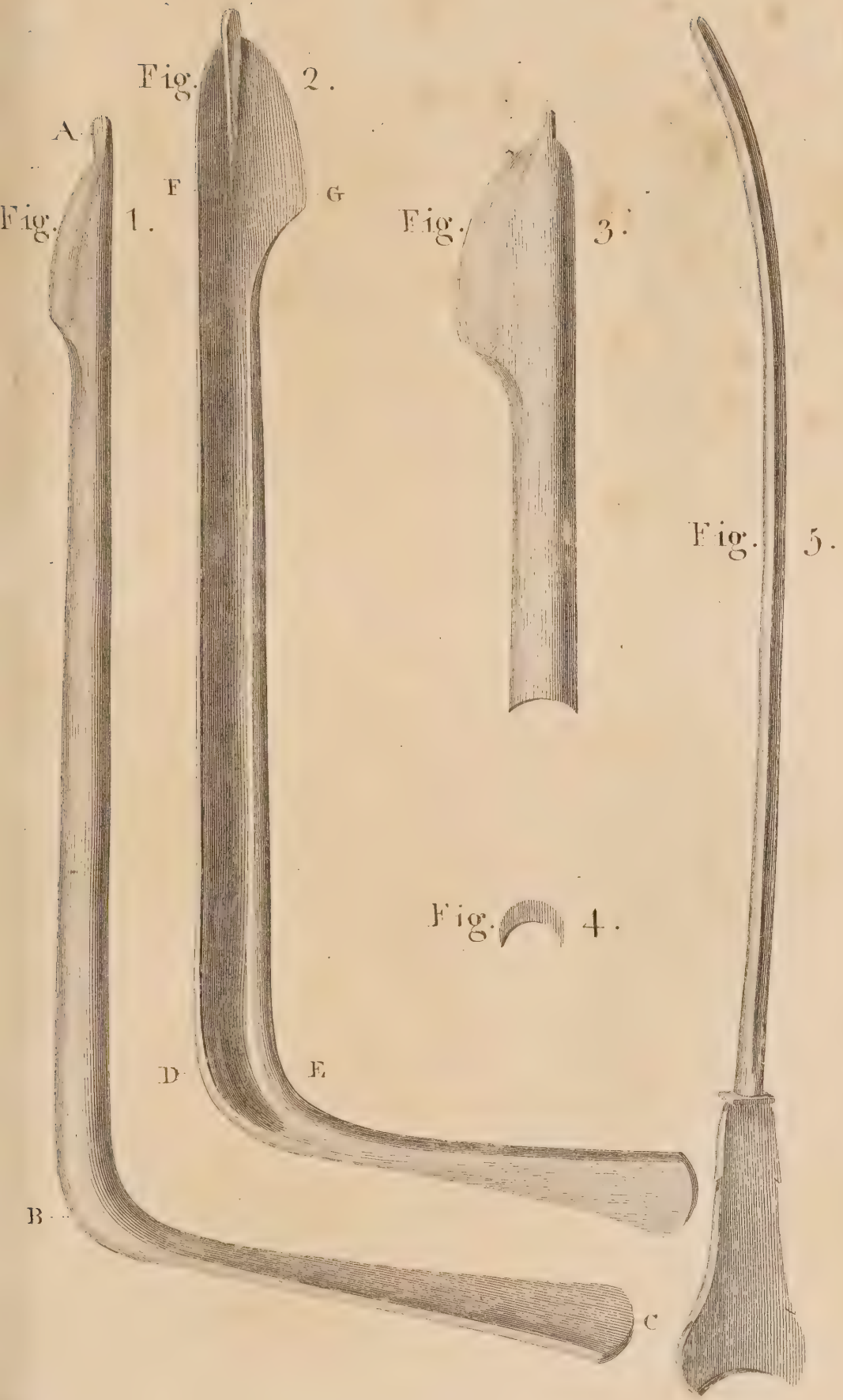


PLATE LXXII.

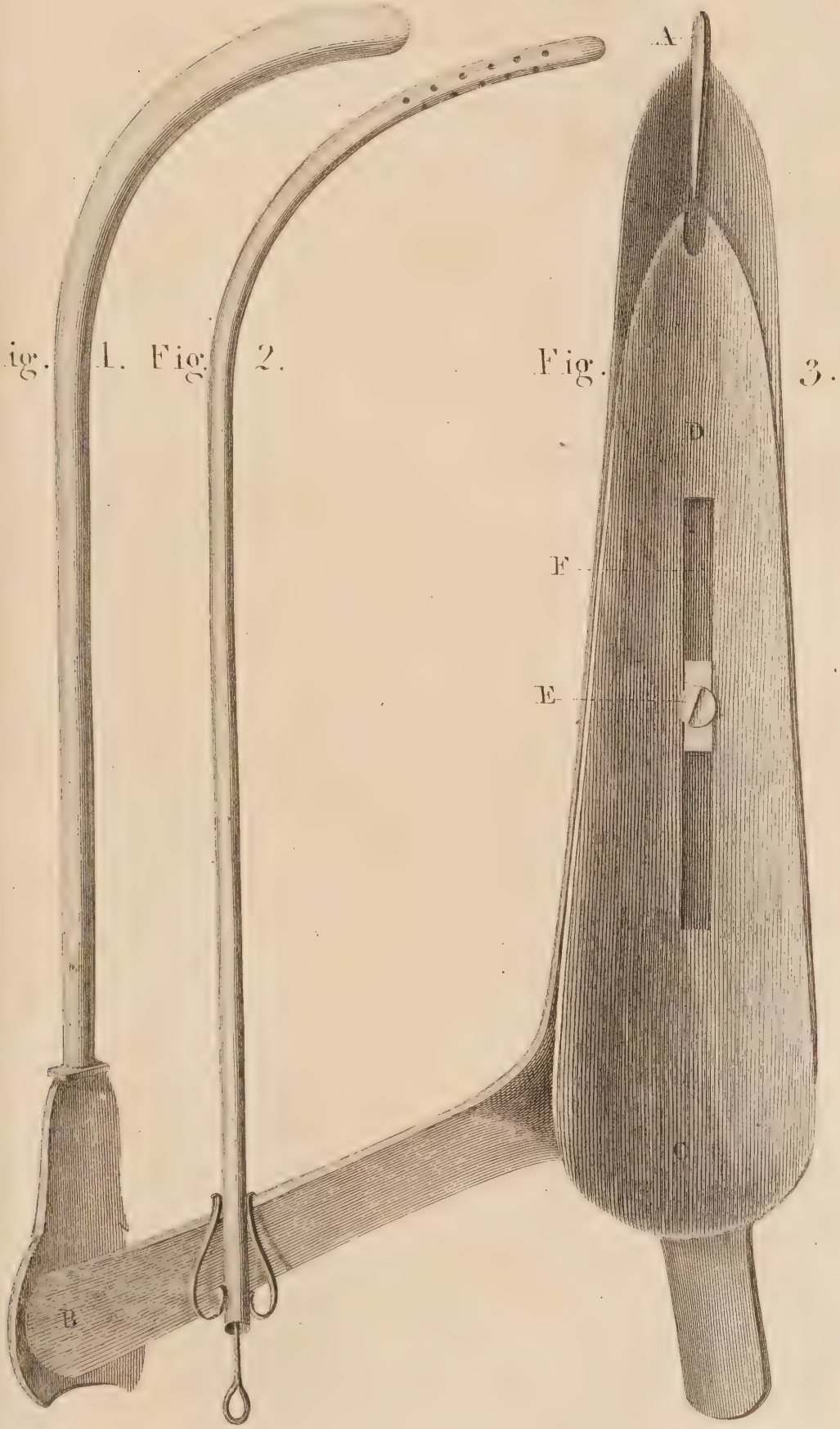


Fig. 1. Fig. 2. Fig. 3.

D'Lizars Sculp

PLATE LXXIII. *Part I.*

Fig. 1.

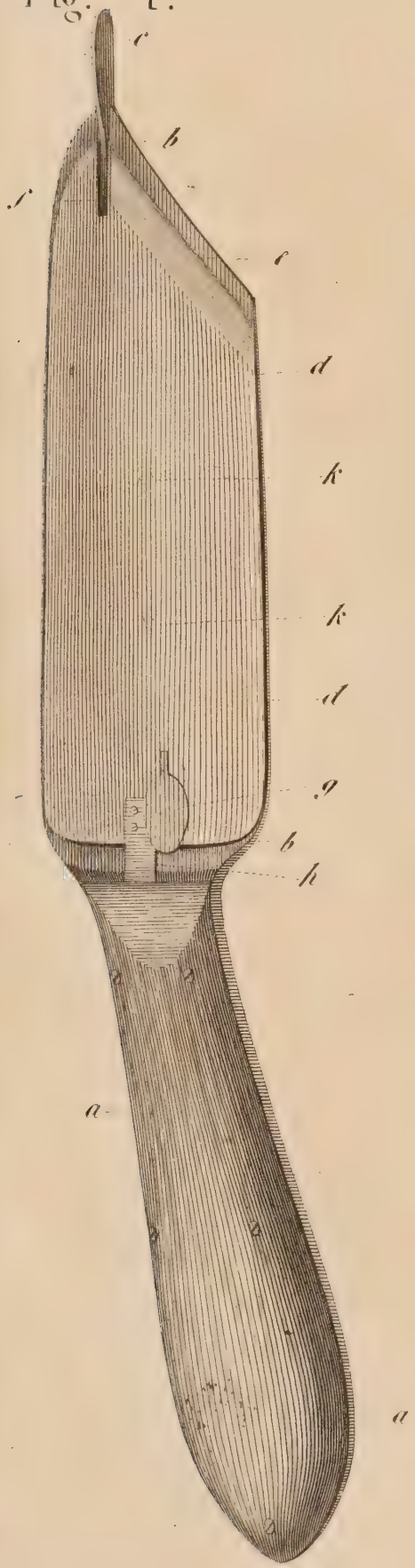
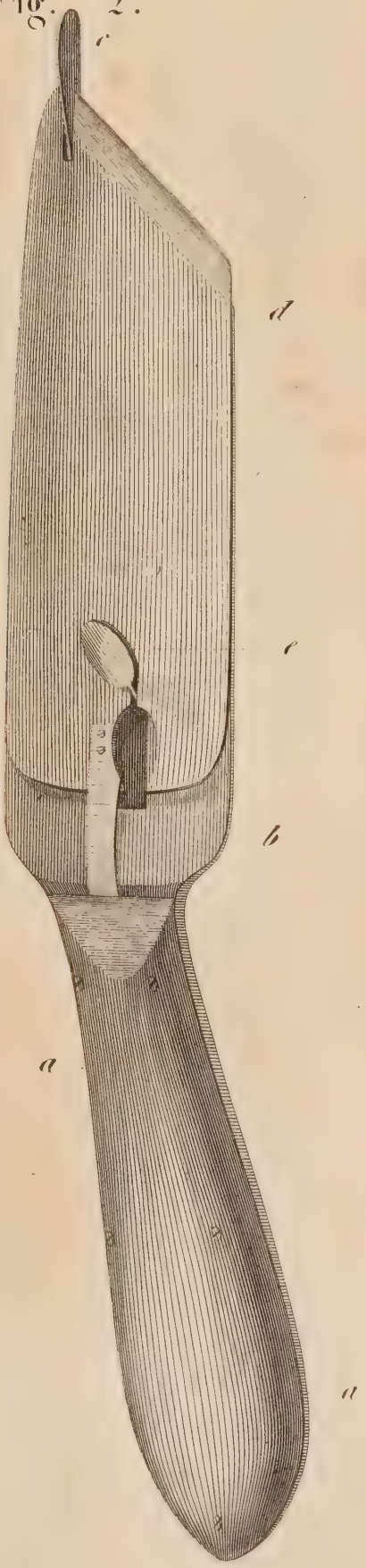


Fig. 2.



D.Lizars Sculp

PLATE LXXIII. *Part II.*

Fig. 4.

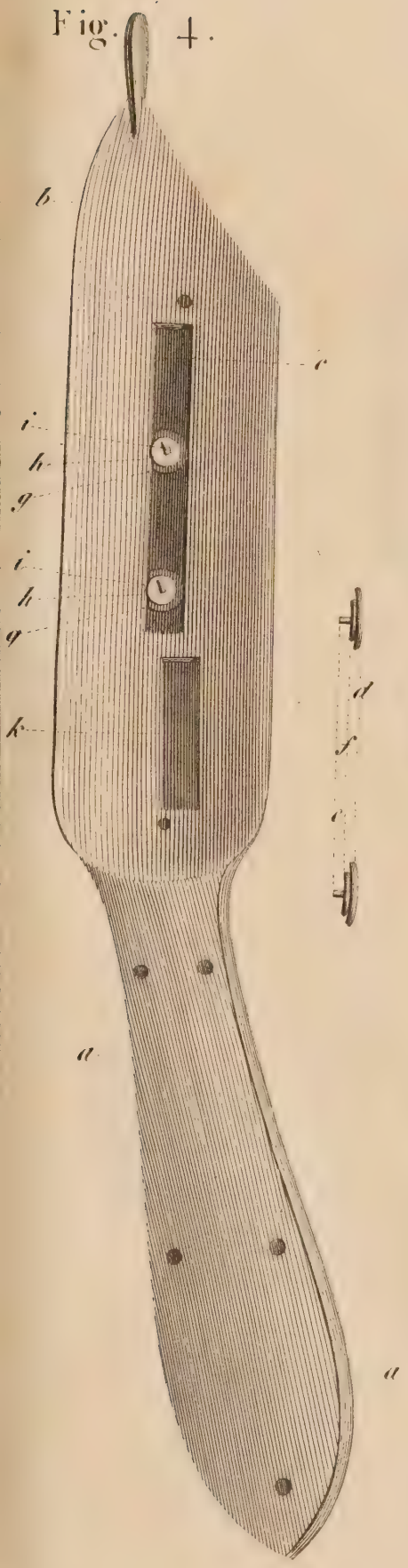


Fig. 3.

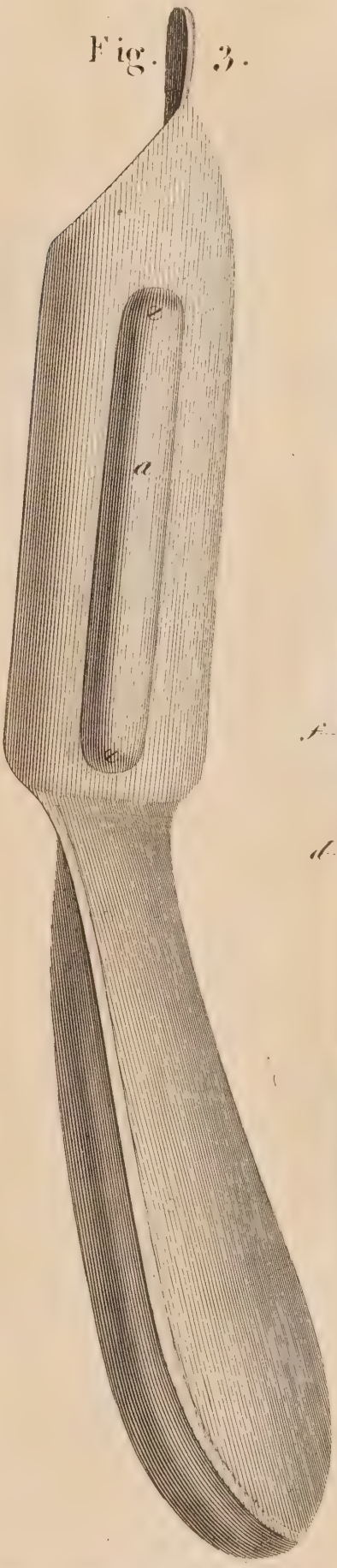


Fig. 5.

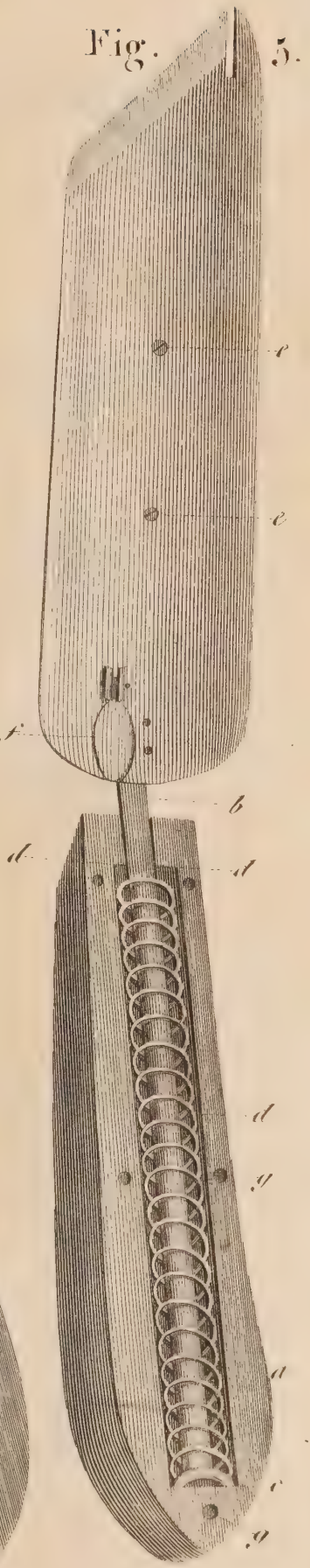


PLATE LXXIV.

Fig. 1.

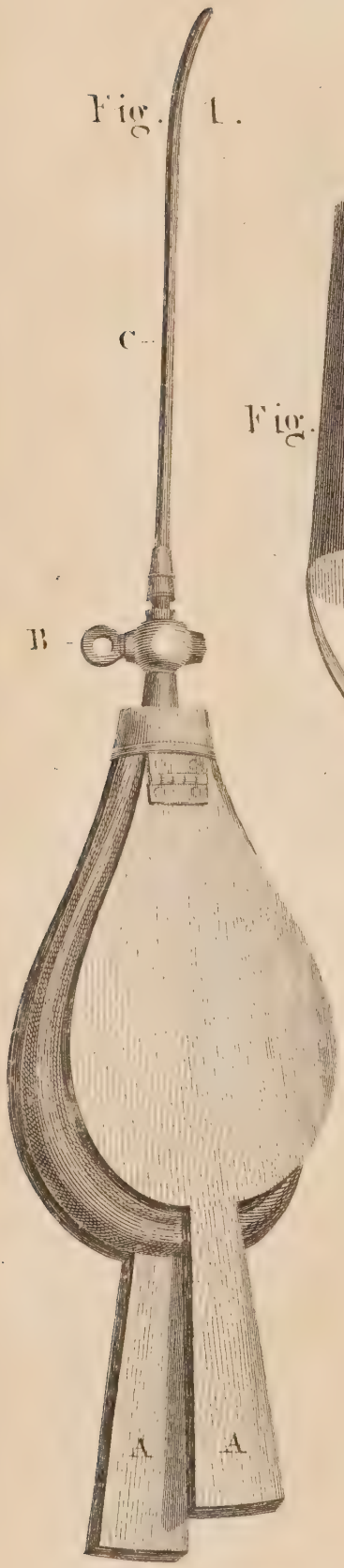


Fig. 2.

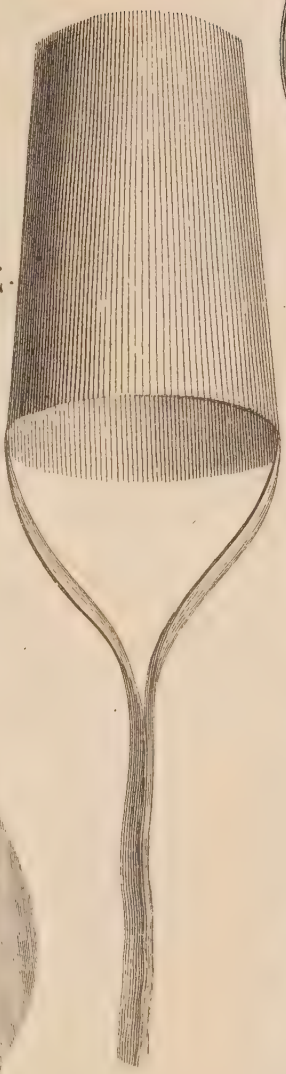


Fig. 3.

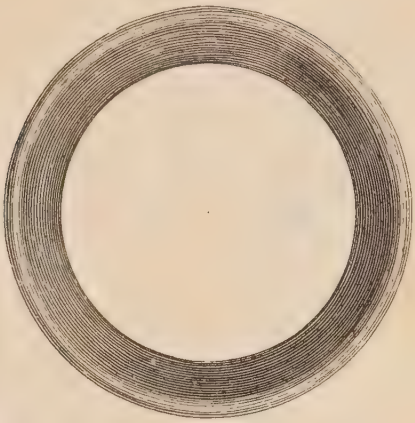


Fig. 4.

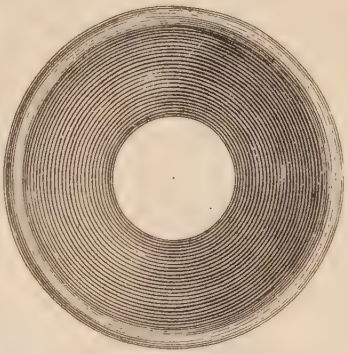


Fig. 5.

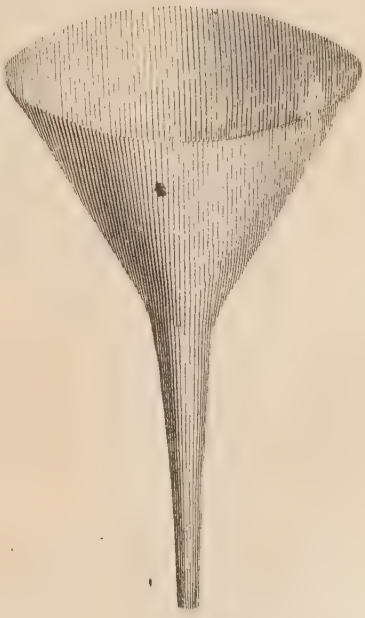


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PLATE LXXV.

Fig. 1.

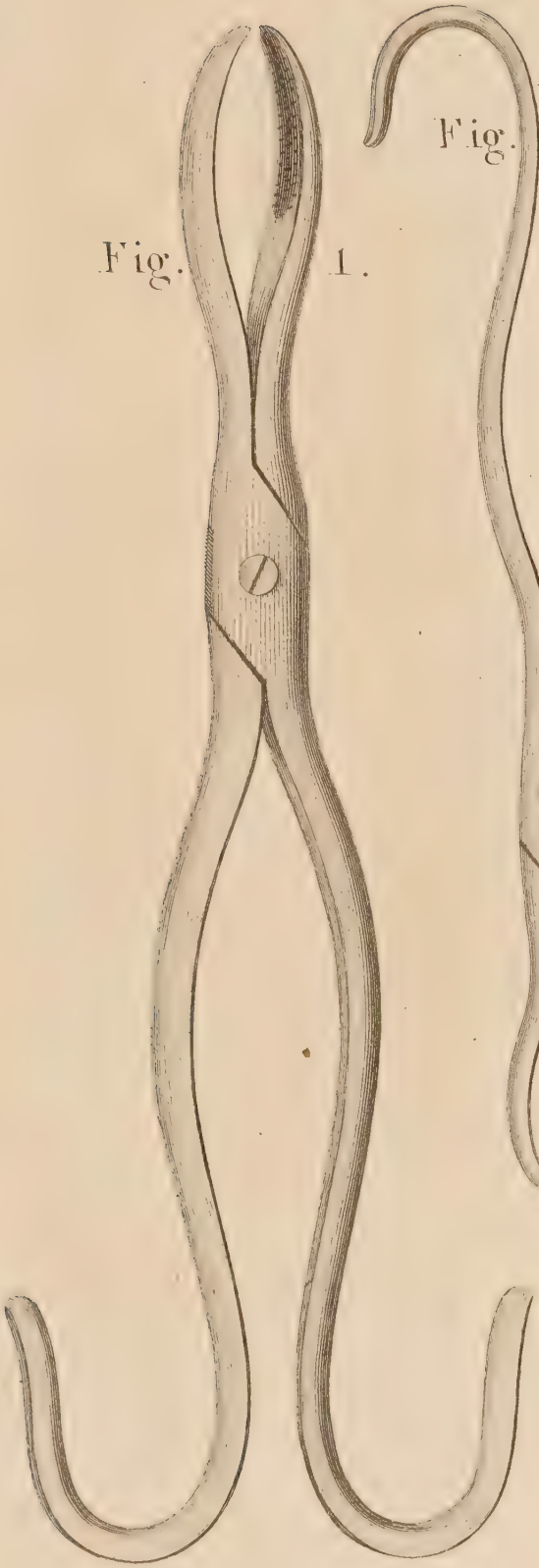


Fig. 2.

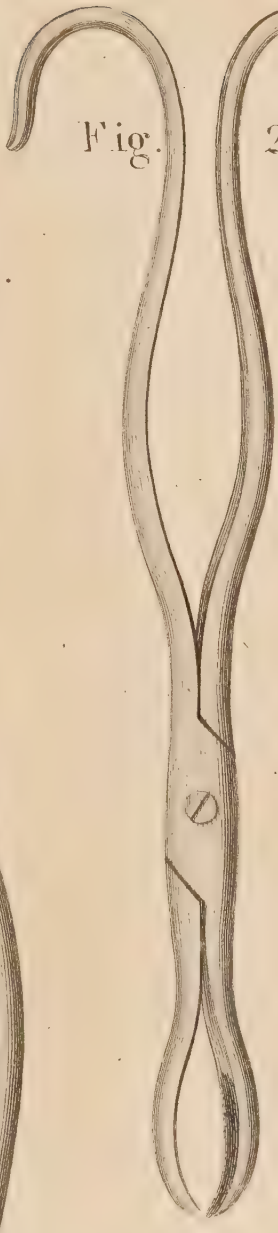


Fig. 3.

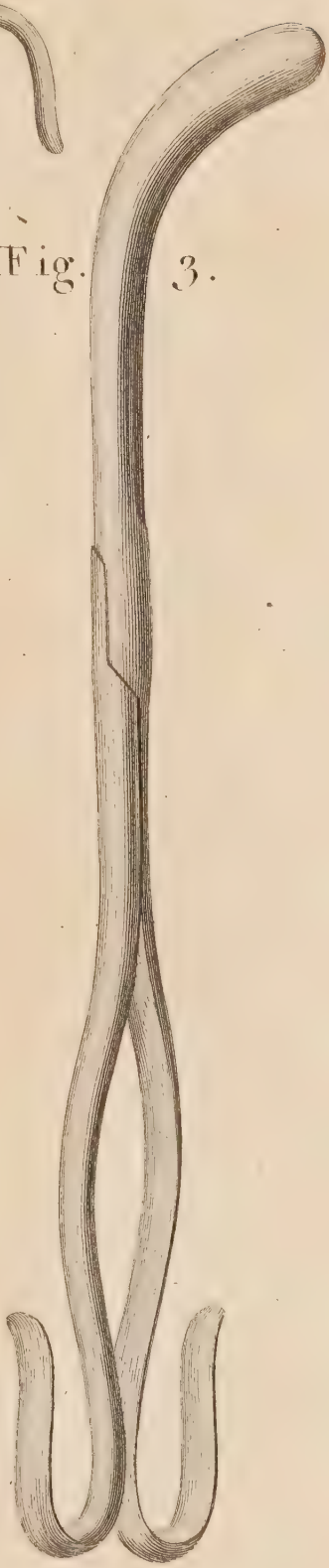


PLATE LXXVI.

Fig. 1.

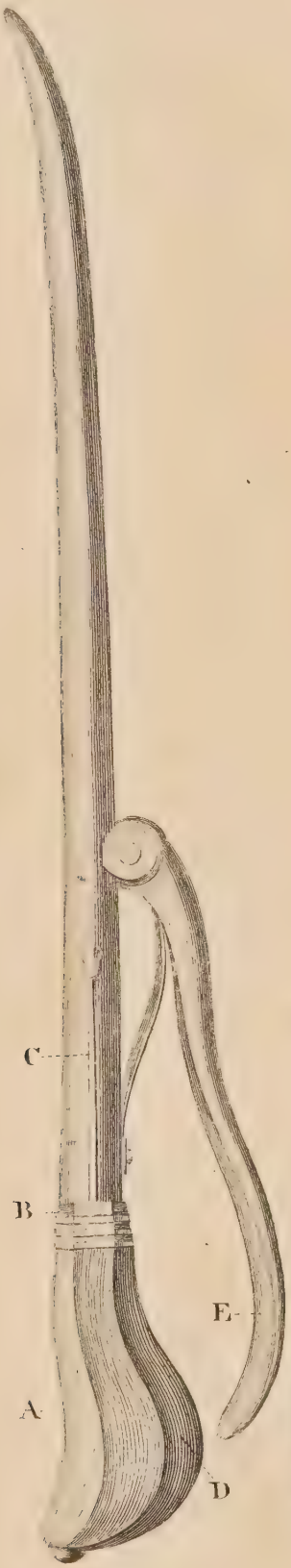


Fig. 3.

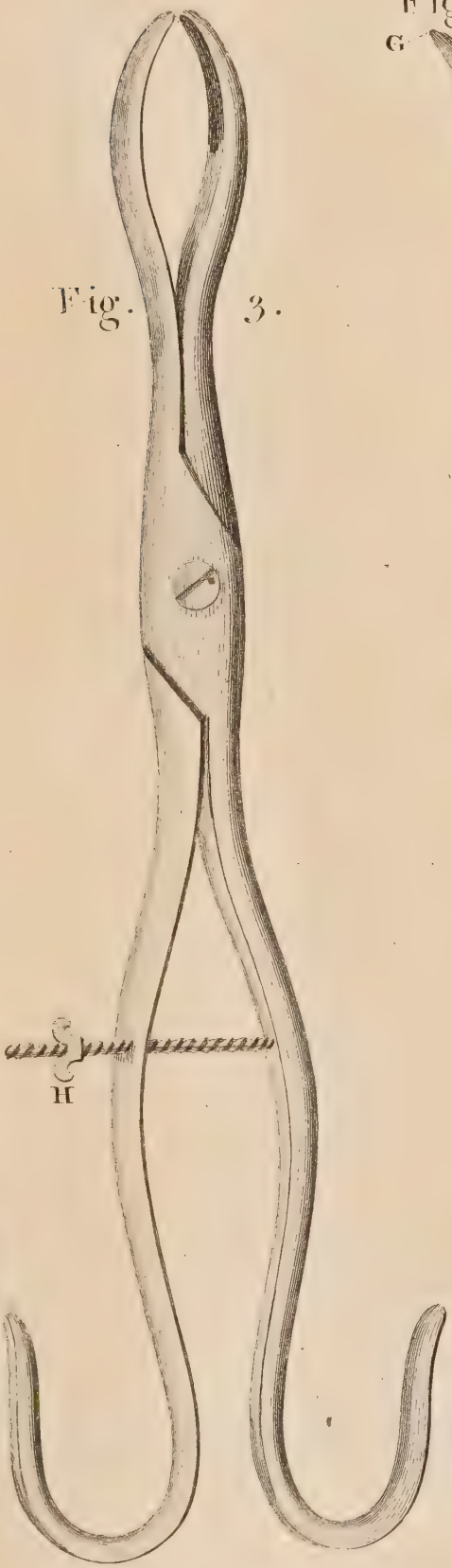


Fig. 2.

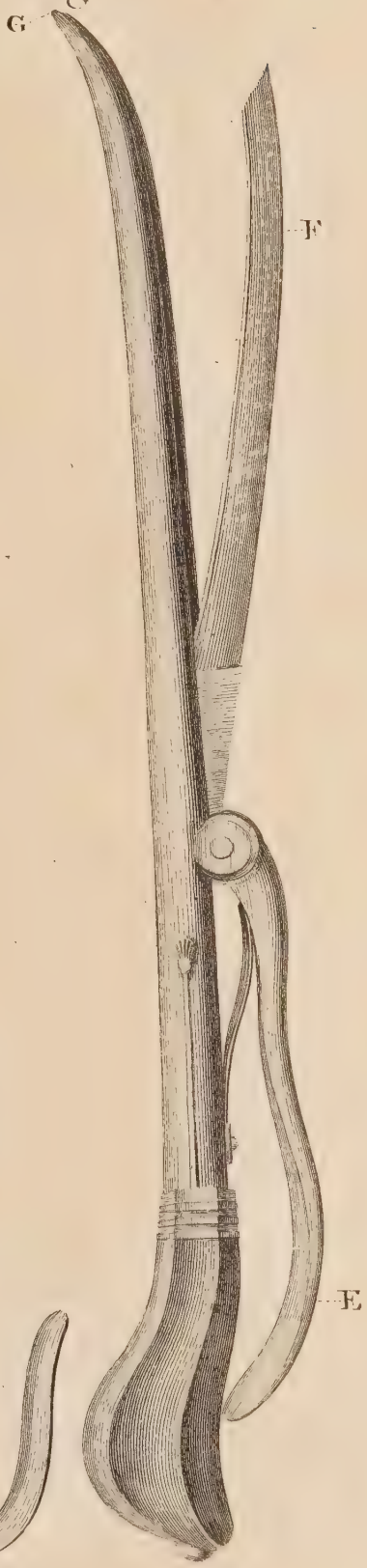
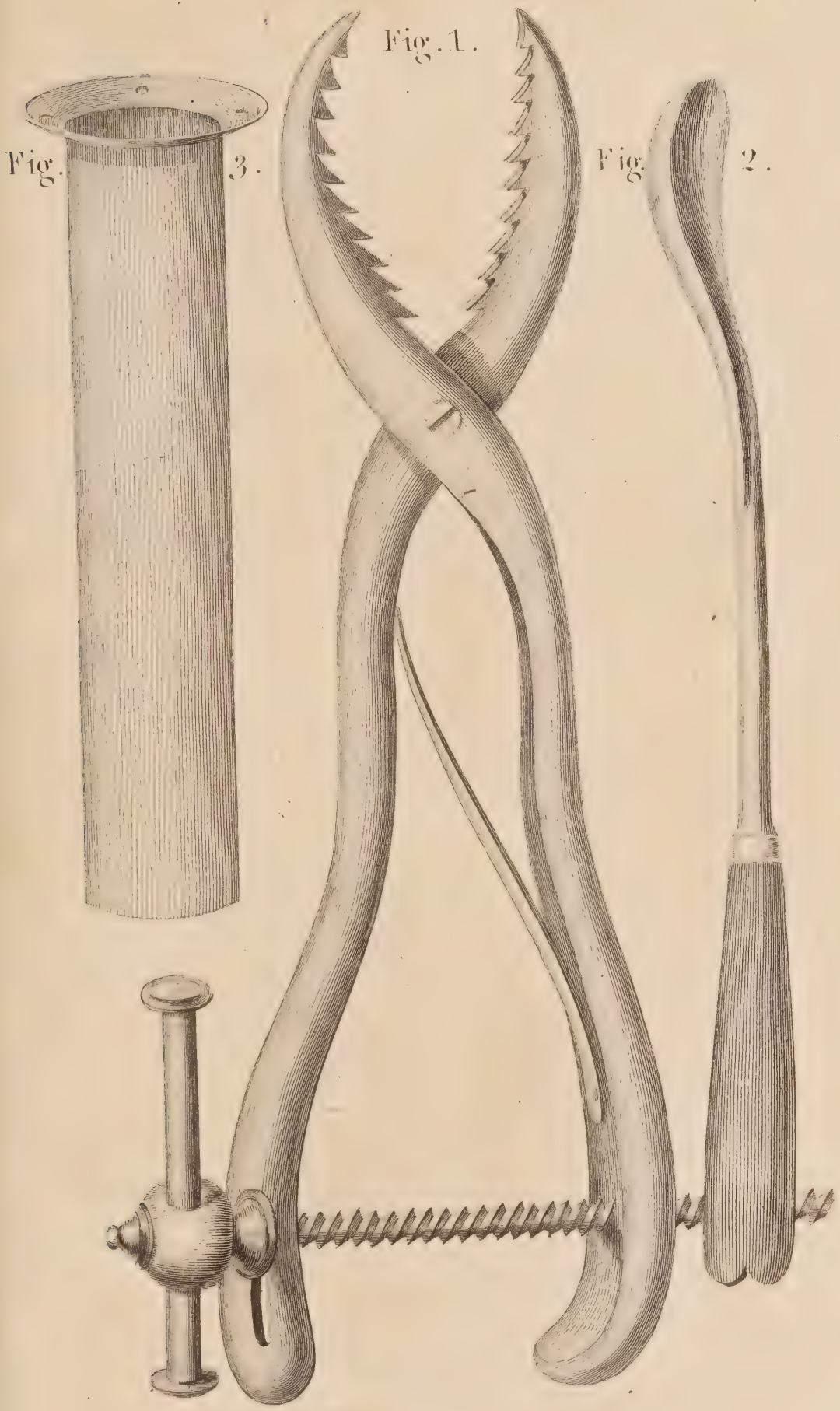


PLATE LXXVII.



D.Lizar's Sculp

PLATE LXXVIII.

Fig. 1.

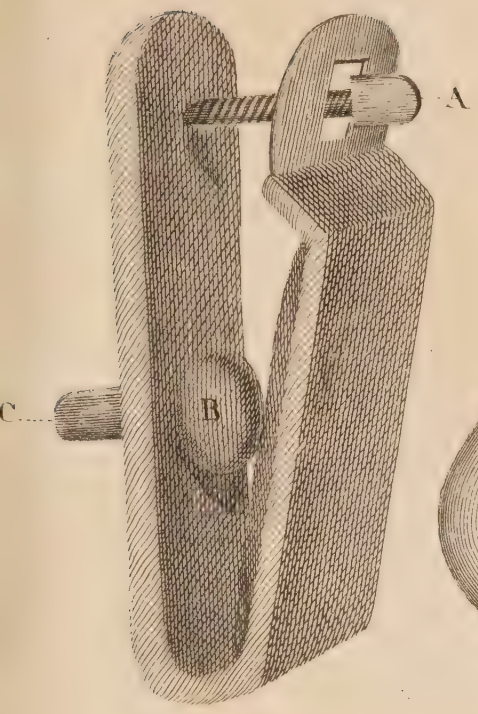


Fig. 2.

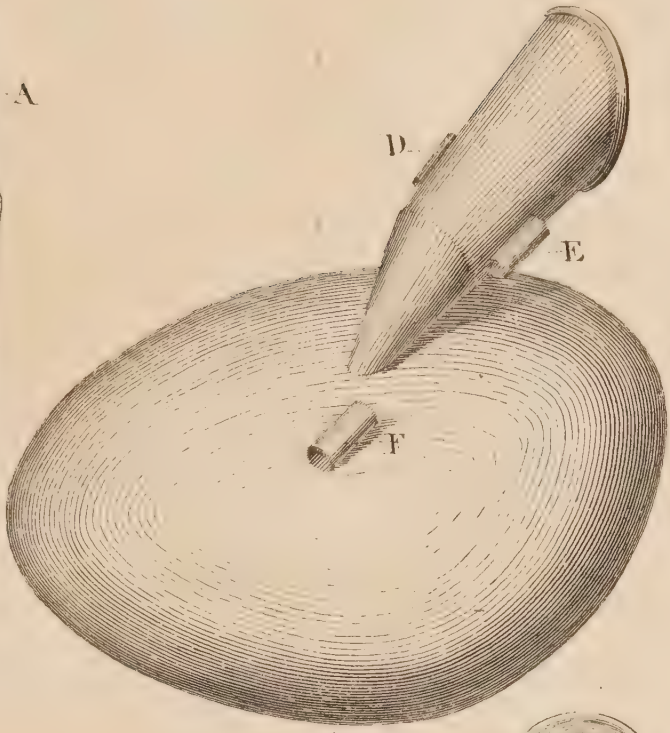
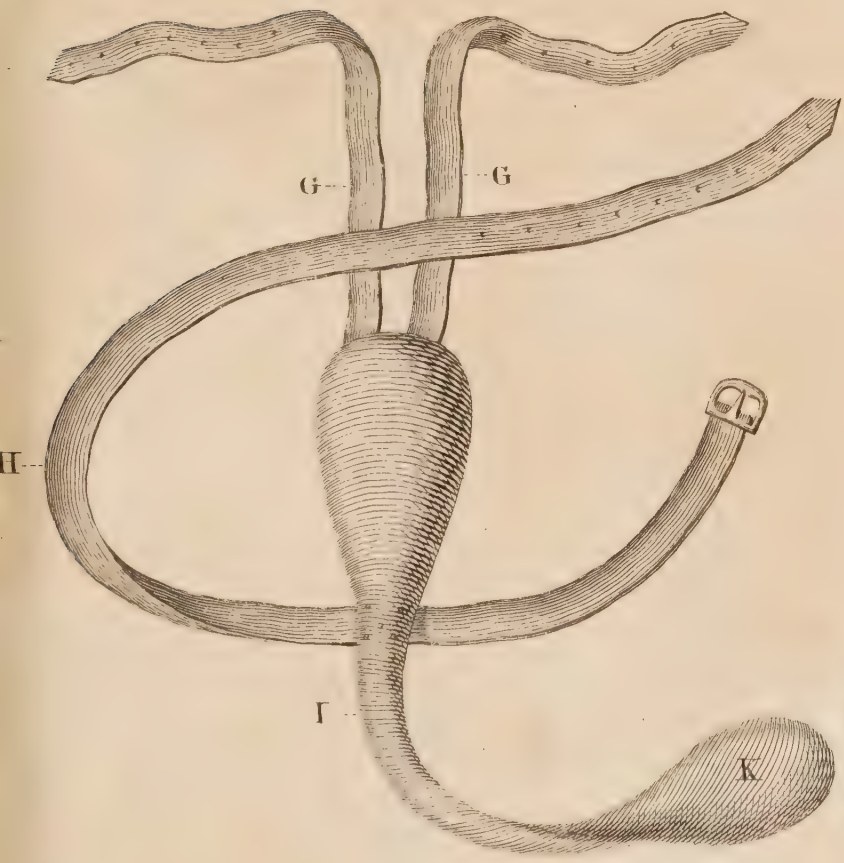


Fig. 3.



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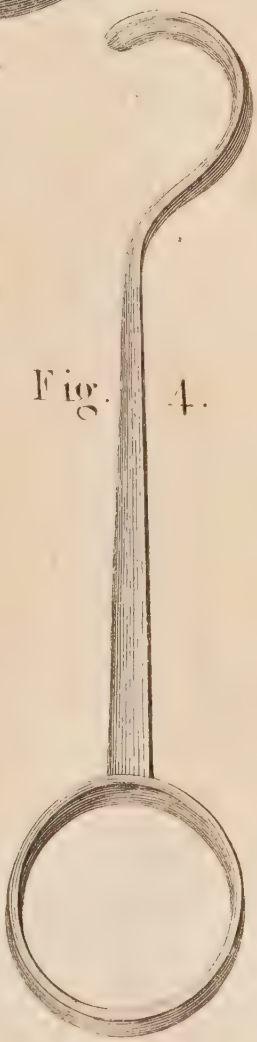


Blizard Sculp.

PLATE LXXIX.

Fig. 1.

Fig. 2.

Fig. 3.

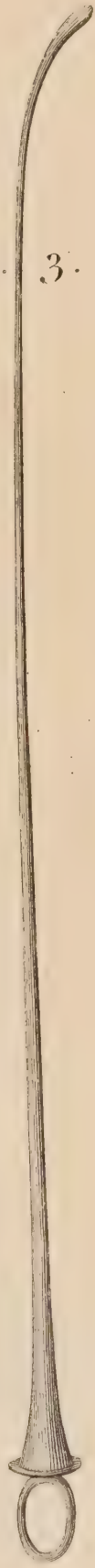


Fig. 4.

PLATE LXXX.

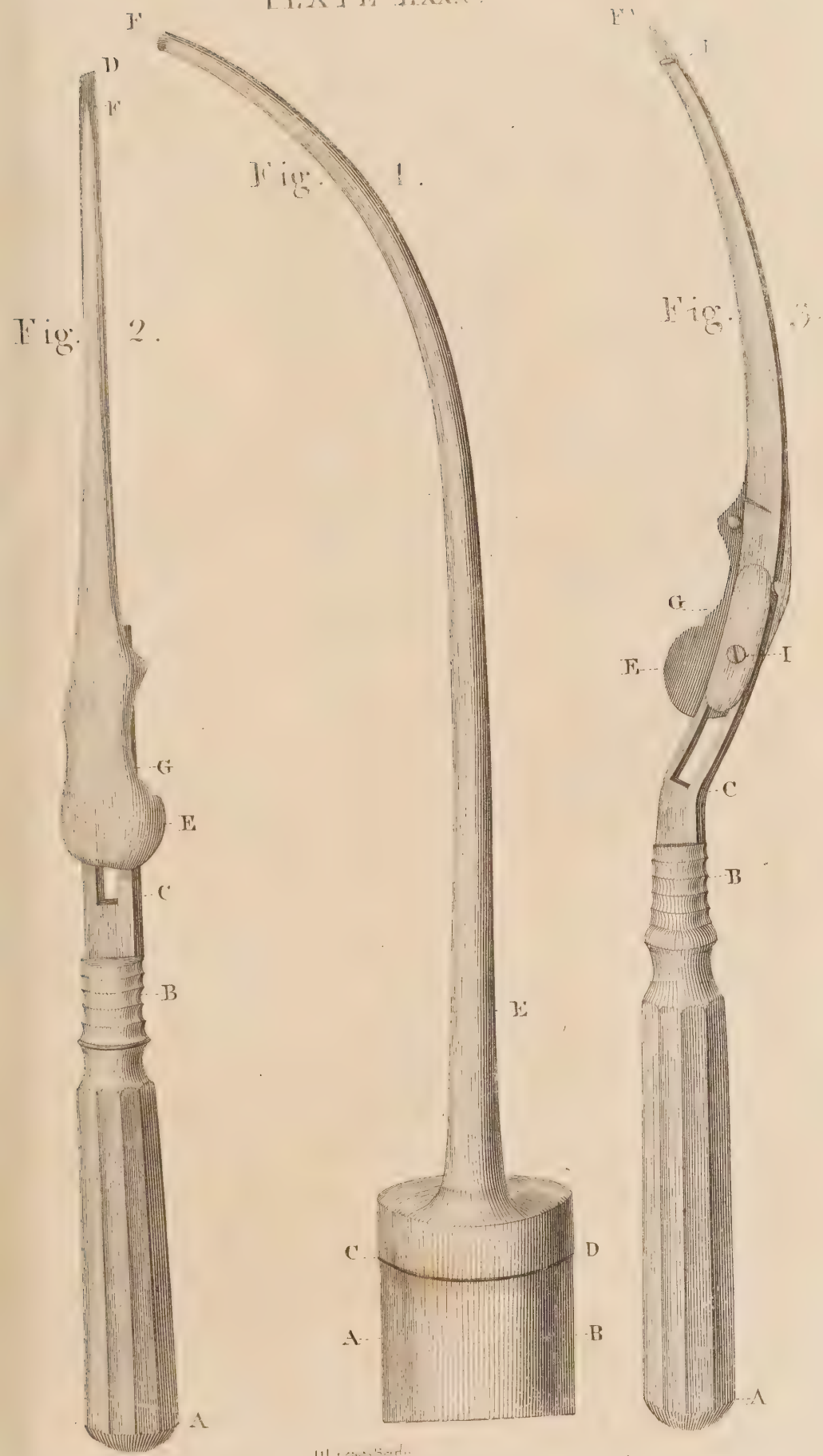


PLATE LXXXI.

Fig. 1.

Fig. 3.

Fig. 2.

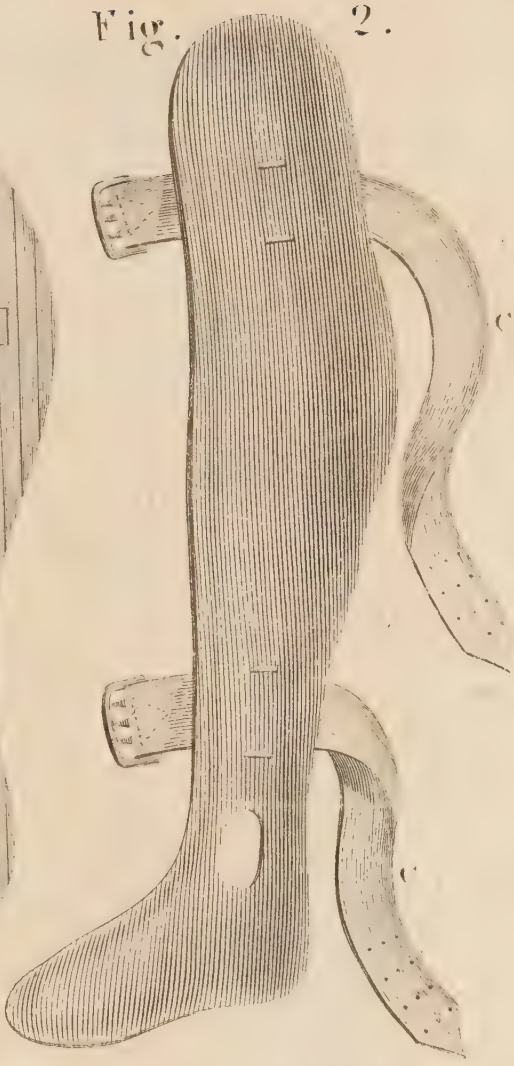


Fig. 4.

Fig. 5.

Fig. 6.

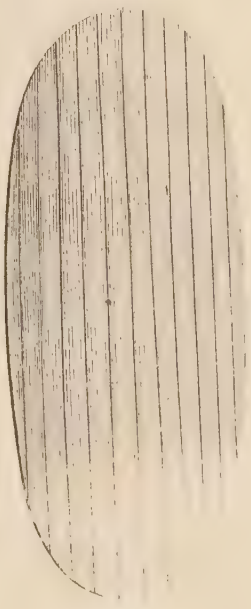


PLATE LXXXII.

Fig. 3.

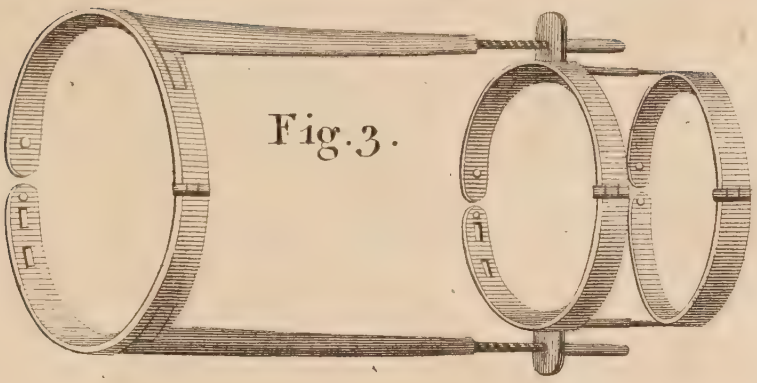


Fig. 4.

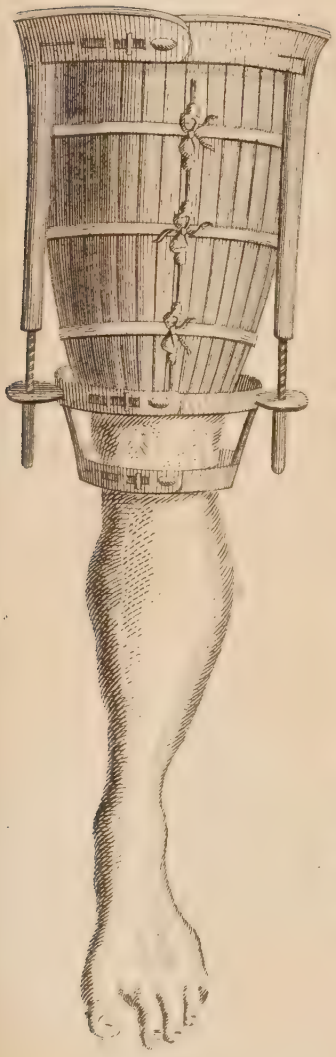


Fig. 1.

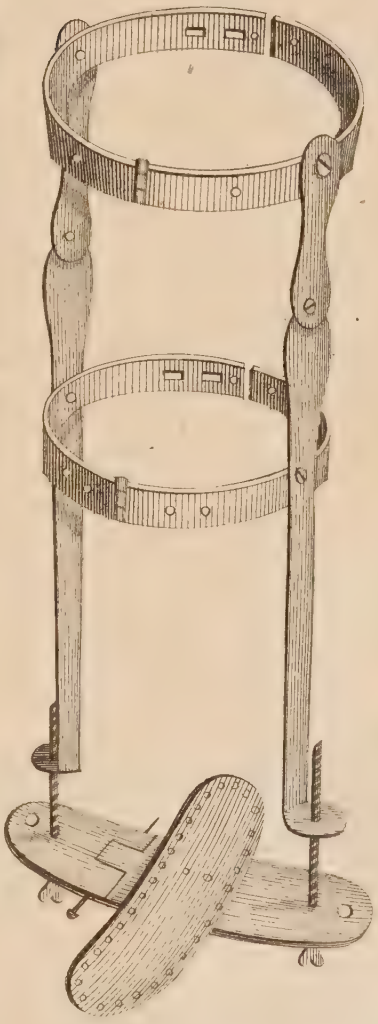


Fig. 2.

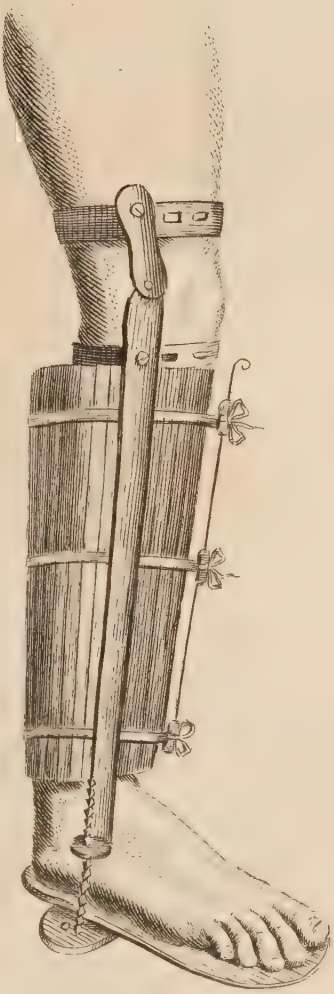


Fig. 5.

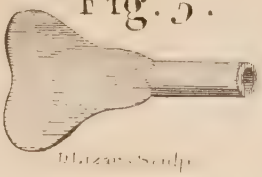


PLATE LXXXIII.

Fig. 1.

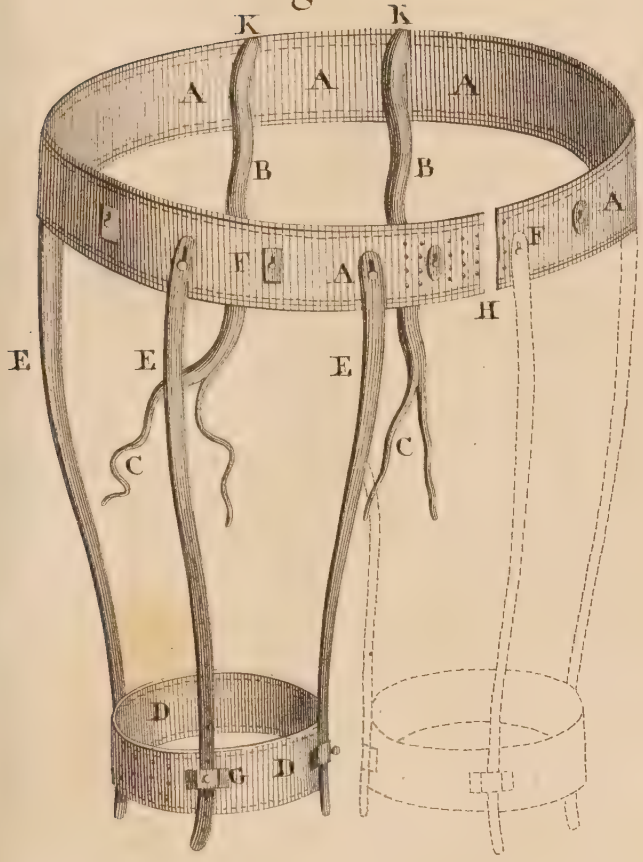


Fig. 2.

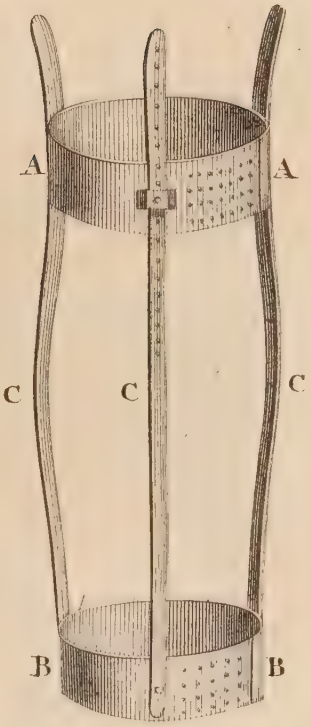


Fig. 3.

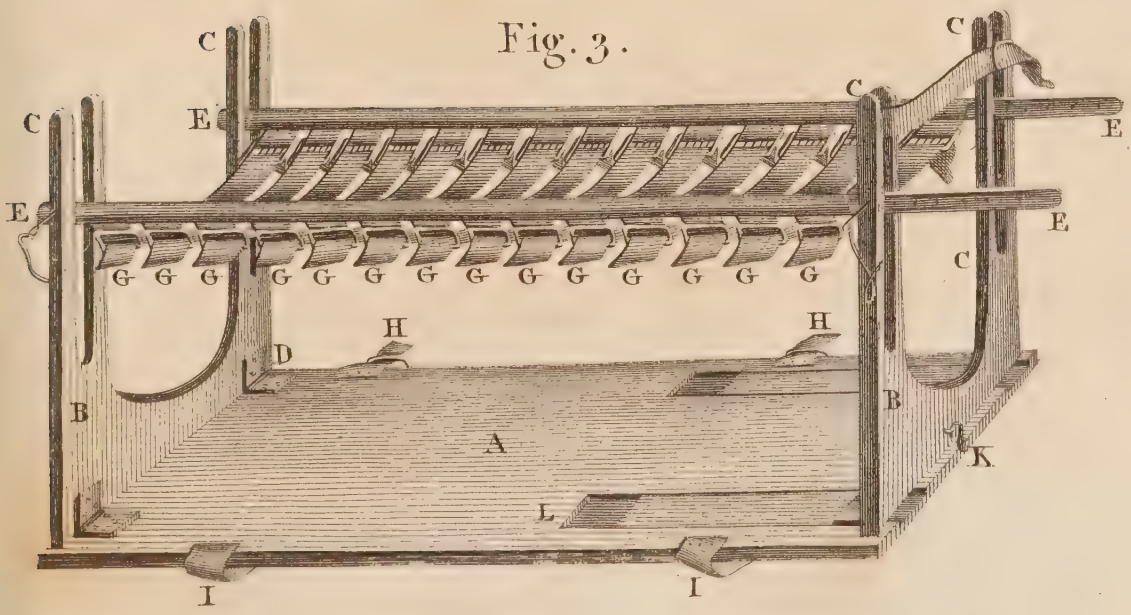


PLATE LXXXIV.

Fig. 1.

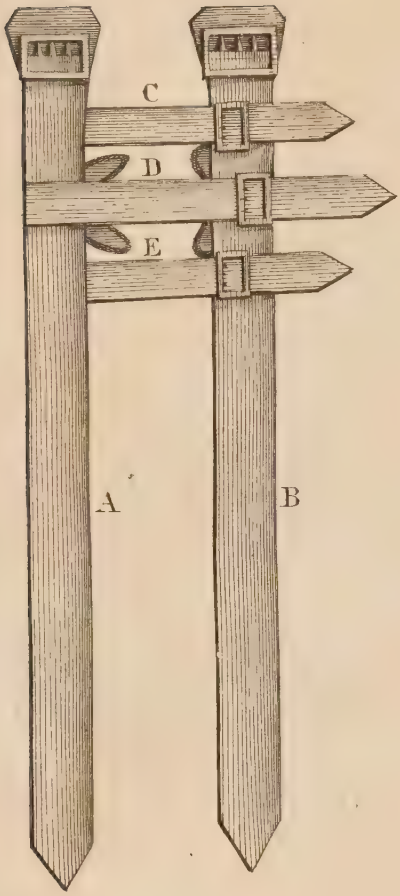


Fig. 2.

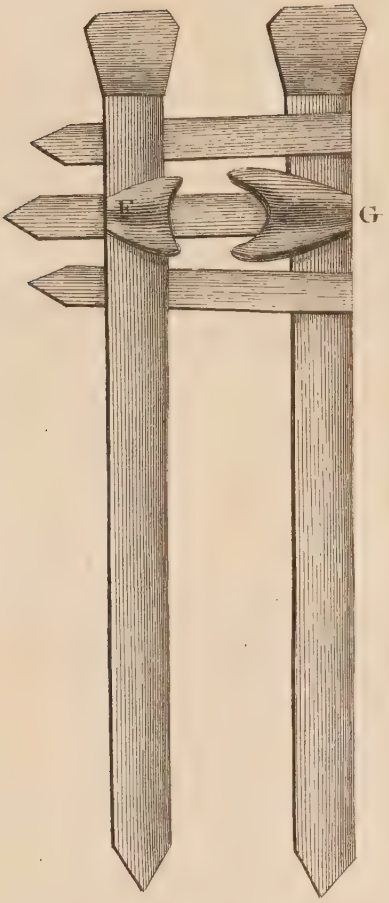


Fig. 3.

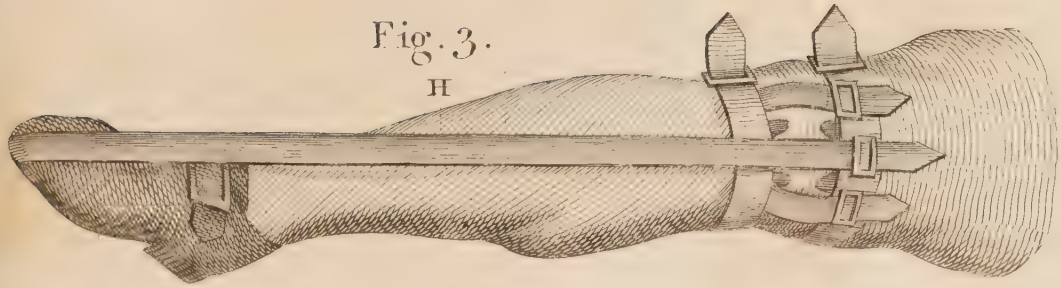


PLATE LXXXV.

Fig. 1.

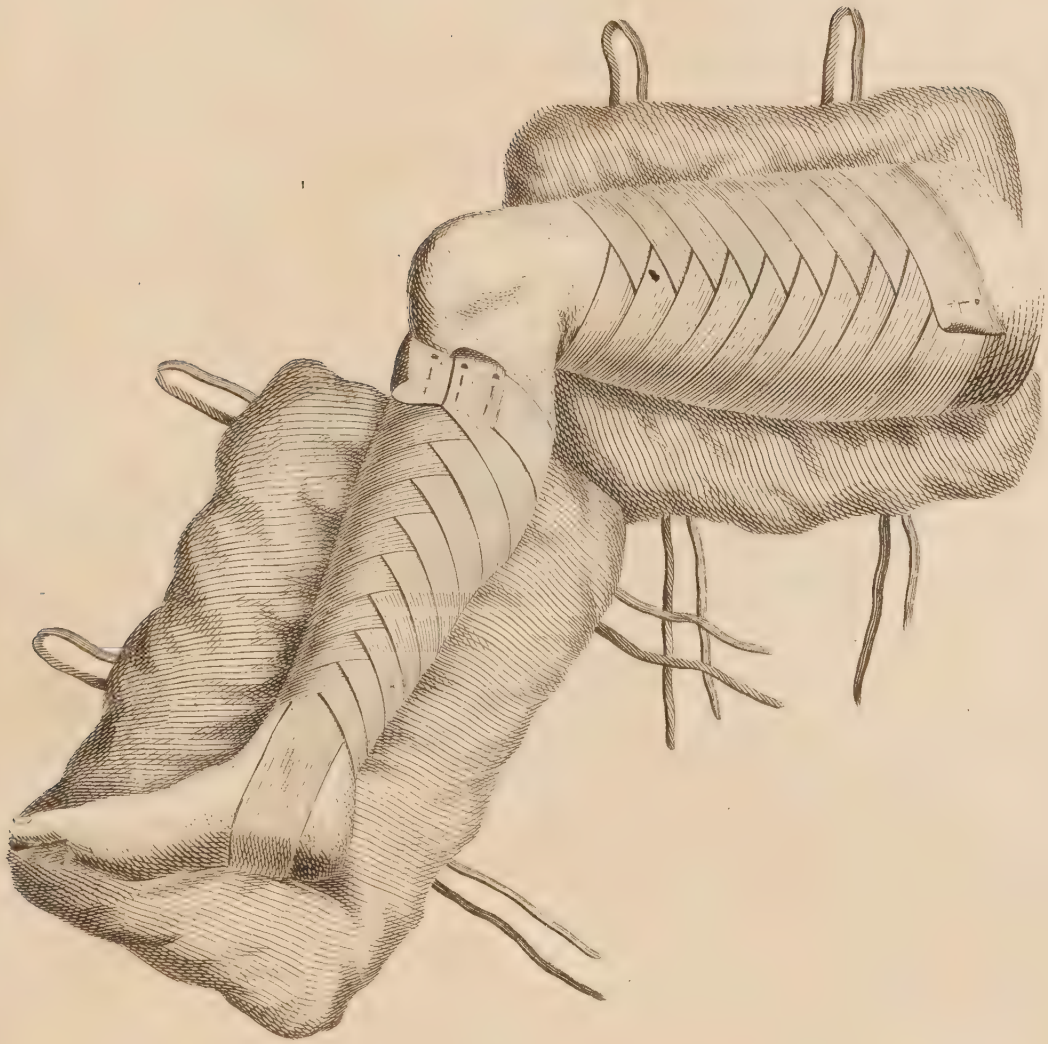
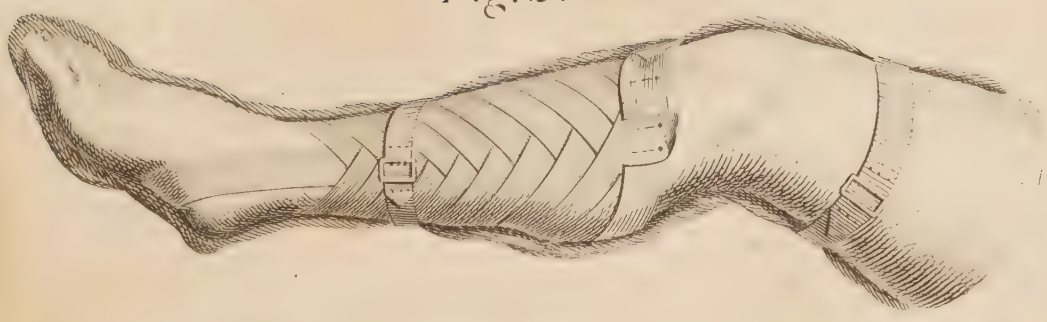


Fig. 2.



D.Lizars Sculp

PLATE LXXXVI.

Fig. 1.

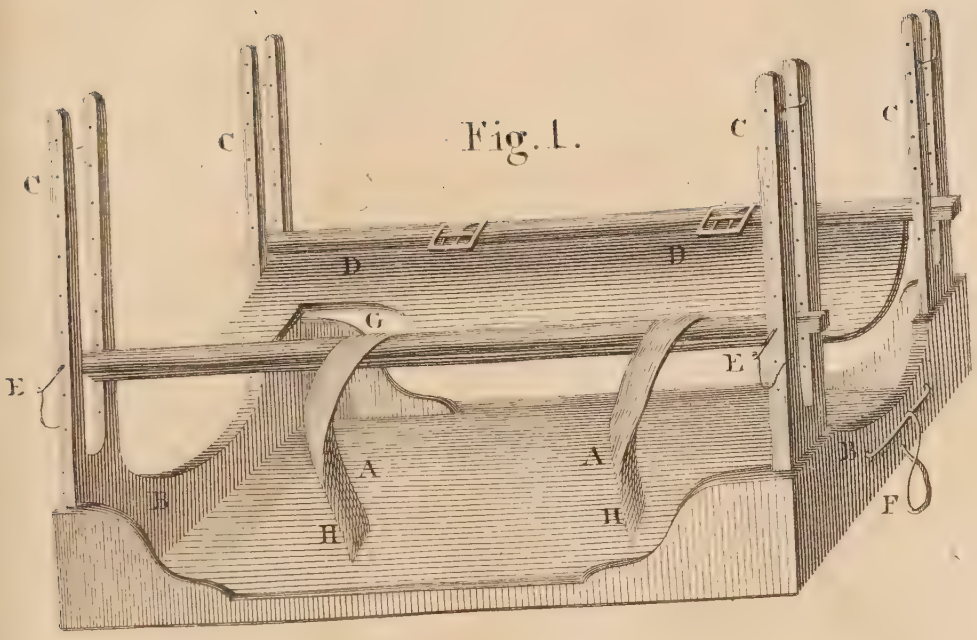


Fig. 2.

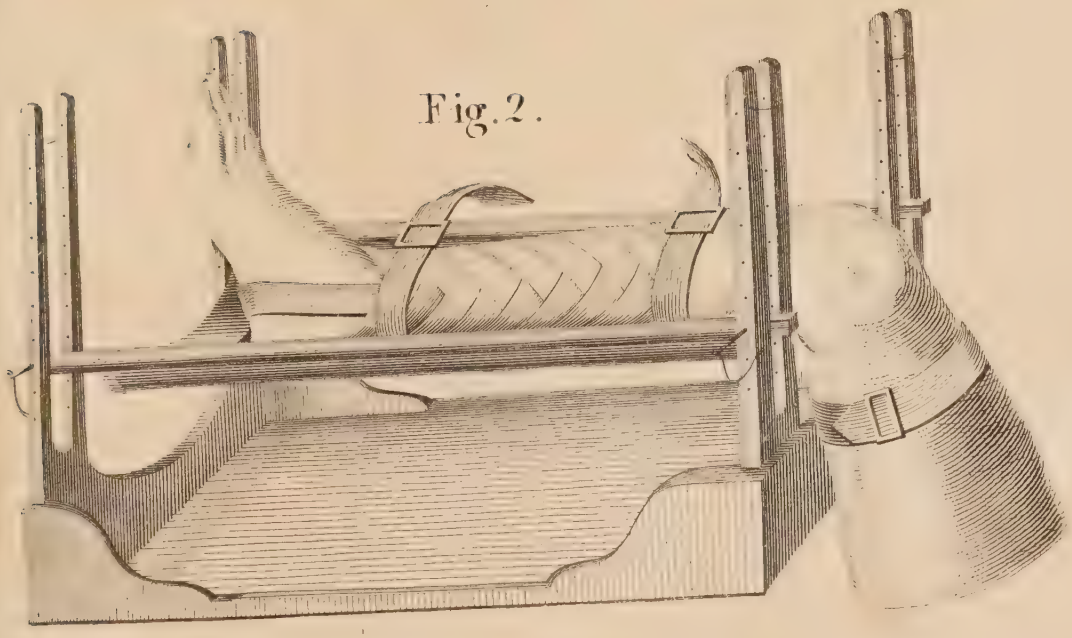


PLATE LXXXVII.

Fig. 1.

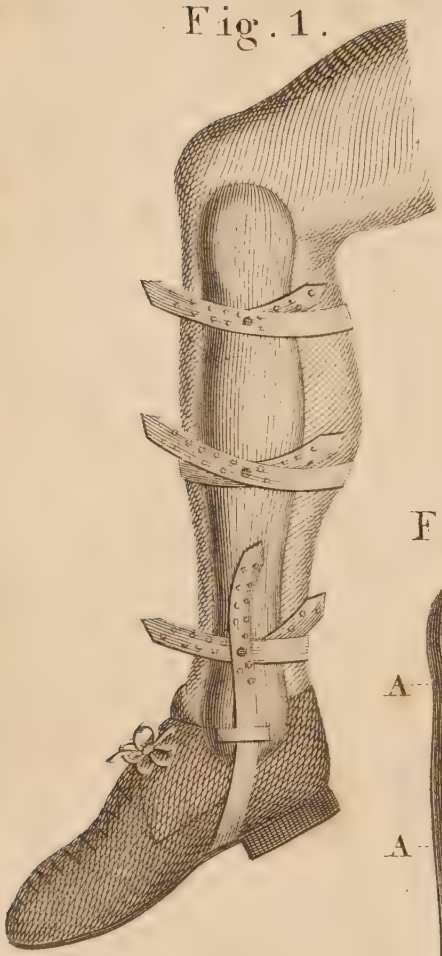


Fig. 2.

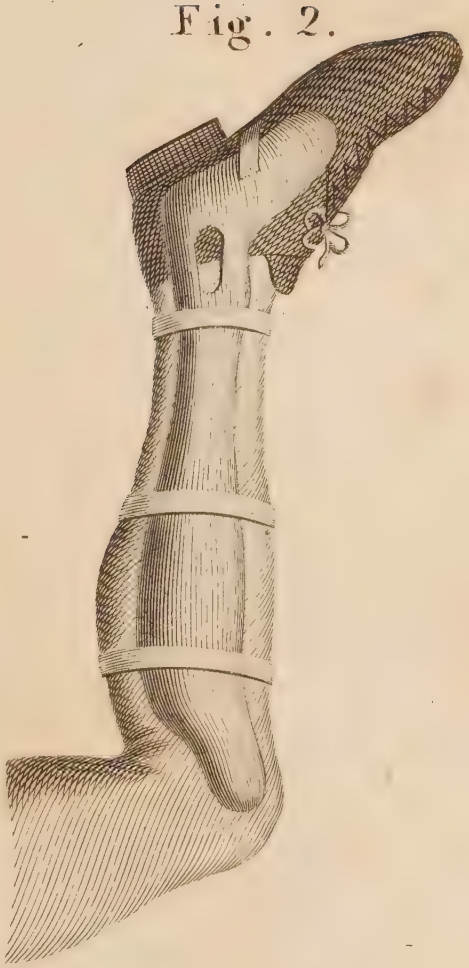
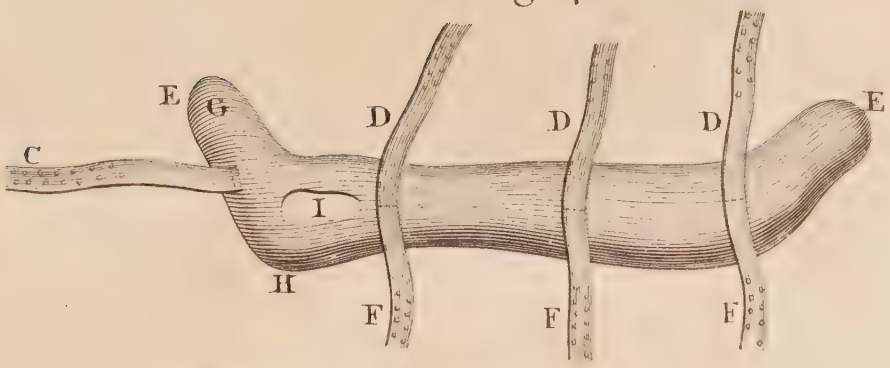


Fig. 3.

Fig. 4.



EXPLANATION

OF THE

PLATES.

PLATE LXVIII.

Fig. 1, 2, and 3. REPRESENT a ſet of inſtruments for the operation of the phymoſis, deſcribed in Chap. XXVIII. Volume VI. page 59.

PLATE LXIX.

Fig. 1. and 2. Staffs for the purpoſe of ſounding.

Fig. 3. A grooved ſtaff for the operation of lithotomy, with the groove on one ſide. This improvement was ſuggeſted

for the purpoſe of paſſing the gorget more eaſily into the bladder; but the uſual form of the ſtaff is found to conduct the gorget with much eaſe; ſo that this alteration has not been generally adopted.

Fig. 3. A common ſtaff of the uſual form, with the groove on the convex part of it.

The curvature here given to theſe inſtruments has by experience been found to anſwer better than any other: There is no neceſſity for that degree of convexity generally given to ſtaffs: The form here repreſented is introduced with more eaſe; and does not injure the urethra, which thoſe with a greater curvature very commonly do. A ſound entirely ſtraight may be eaſily paſſed into the bladder, merely by ſtretching the penis in ſuch a manner, that the urethra may be kept in a direct line with the arch formed by the junction of the oſſa pubis: But a ſtaff entirely ſtraight is ill fitted for exploring the different parts of the bladder; ſo

ſo that ſome degree of curvature is with much propriety given to it.

A ſtaff for a full-grown male ſubject ſhould be twelve inches long, beſides the handle; and ſeven or eight inches for children of ſeven years and under.

Plate LXX.

This inſtrument ſhould, for adults, be five inches and a half in length beſides the handle; an inch and quarter broad at its wideſt part, and made to contract gradually to the point: The beak ſhould be exactly adapted to the grooves of the ſtaffs with which it is uſed; and ſhould be turned a little forward, inſtead of being perfectly ſtraight or turned back as is ſometimes done: By this means it is carried with more ſteadineſs along the groove of the ſtaff than can otherwiſe be done. In Volume VI. Chap. XXIX. Sect. VII. I have mentioned ſome objections to this gorget, and the reaſons that induce me

to conſider the alterations made upon it in fig. 1. and 2. of the ſame plate, as well as the cutting director Plate LXXI. as preferable inſtruments. In fig. 1. and 2. the left or blunt ſide of the gorget is not near ſo broad as in the gorget of Mr Hawkins, by which it enters with more eaſe, and does not tear the parts ſo much. The handle goes off nearly at a right angle from the body of the inſtrument, inſtead of having an oblique direction as in fig. 4.; and being made of timber inſtead of ſteel, the ſurgeon holds it with more eaſe and firmneſs.

Fig. 3. A female catheter. This inſtrument is repreſented ſtraight, as being more eaſily introduced than when much crooked: A ſound for females, however, ſhould have a ſmall curvature, as being better adapted for diſcovering a ſtone in the bladder than a ſtraight ſtaff. A grooved ſtaff of this form is repreſented in fig. 5. Plate LXXI.

Fig. 4. The cutting gorget of Mr Hawkins, with the edge made to expand more than

than the uſual form of this inſtrument, by which it divides the proſtate gland more freely.

Plate LXXI.

Fig. 1. A ſide-view of the cutting director deſcribed in Volume VI. Chap. XXIX. Sect. VII. This inſtrument for adults ſhould be five inches and a half from *A* to *B*, and three inches from *B* to *C*.

Fig. 2. Repreſents a front-view of the ſame inſtrument.

Fig. 3. Affords a back-view of it; and fig. 4. a tranſverſe ſection.

This director, in the grooved part of it, ſhould be three-eights of an inch broad, namely from *D* to *E*; and the cutting part of it, from *F* to *G* ſhould be nearly an inch. The beak ſhould be exactly fitted to the groove of the ſtaff with which it is to be uſed.

In order to obtain a free paſſage for the ſtone, it has been propoſed to increaſe the breadth of the cutting part of Mr Hawkins's

kins's gorget to a great extent: By ſome, it has even been ſaid, that it may be two inches broad. This, however, proceeds from inattention to the anatomy of the parts concerned in the operation; for that part of the urethra through which the gorget muſt paſs to the bladder, is ſo much confined by the contiguous bones, that it is not poſſible to paſs a gorget of this ſize into it in a proper direction. The proſtate gland ſhould be divided laterally in a horizontal direction. Now, this cannot be done with an inſtrument of this breadth. But, even although it were eaſily practicable, there is no neceſſity for ſuch an extenſive wound as this inſtrument would make. I have elſewhere ſaid, that nothing ſhould be left for the director or gorget to divide but the proſtate gland, together with a very ſmall portion of the neck of the bladder; and as this is done in the moſt complete manner, both by the cutting director of this plate, and the improved gorget of Mr Hawkins in figures

1. and 2. Plate LXX. an inſtrument of a greater breadth is not neceſſary.

The back-part of the cutting director being conſiderably narrower than the common gorget, it ought to be ſufficiently ſtrong to overcome any reſiſtance with which it may meet in paſſing into the bladder. The tranſverſe ſection, fig. 4. ſhows the ſtrength of it.

For children from three to ſeven years of age, this inſtrument ſhould not exceed three inches in length; and one of four inches will anſwer for every age above this to the twentieth year.

The cutting edge of this director, as well as the cutting part of the gorget in Plate LXX. is repreſented upon the right ſide of the inſtrument, by which the wound in the operation of lithotomy is made in the left ſide of the patient: But for a ſurgeon who operates with his left hand, this muſt be reverſed, ſo that the cut may be made in the right ſide of the perinæum.

Fig. 5. A grooved ſtaff for the operation of lithotomy in females.

Plate LXXII.

Fig. 1. An inſtrument I have named a Searcher.

In lithotomy it frequently happens, that the ſtone is not readily felt with the forceps. When not diſcovered by the other means I have adviſed, it may frequently be found by introducing this inſtrument at the wound; being thick it anſwers better for this purpoſe than a common ſound; and when once the ſtone is diſcovered, the ſearcher ſhould be kept in cloſe contact with it with one hand, while the forceps are conducted to the ſtone by means of it with the other. In this manner, ſtones are ſometimes diſcovered, which could not otherwiſe be met with. This inſtrument ſhould be made of ſteel, and ſhould be nine or ten inches in length.

Fig. 2. A male catheter of ſilver. The ſmall holes near the extremity of this inſtrument

ſtrument anſwer better than a ſlit on each ſide, as with theſe it does not ſo readily catch the membrane of the urethra. Catheters have likewiſe been made of other materials, namely, of leather, and of flexible ſilver-wire rolled into the form of a tube, and covered with bougie plaſter; and a few years ago a very neat invention appeared, prepared of reſina elaſtica. Theſe laſt prove particularly uſeful in caſes that require catheters to remain in the bladder for ſome days together; and of late I have found, that when properly prepared, they retain their firmneſs for a conſiderable time. I have kept a catheter of this reſin in the bladder for three weeks together, without being hurt by the urine.

Fig. 3. Is an improvement of the gorget by Dr Monro. It conſiſts of a common gorget *A B*, with a blunt gorget *C D* fitted to it: The nail *E* fixed in the cutting gorget paſſing through the ſlit in the blunt gorget *F*, the latter is thus made to run eaſily upon it. In uſing this inſtrument,

inſtrument, the blunt gorget muſt be pulled back, ſo as to admit of all the cutting part of the other to project before it: And as ſoon as it has reached the bladder, the blunt gorget ſhould be puſhed forward; by which means the contiguous parts are effectually protected from farther injury, as the ſide of the blunt gorget ſhould be made conſiderably deeper, ſo as to project over the cutting edges of the other.

This is an ingenious contrivance; and it anſwers the purpoſe completely, of protecting the ſurrounding parts, while the inſtrument is withdrawing; a point of much importance, and not always duly attended to.

Plate LXXIII. Parts I. and II.

The inſtruments of both parts of this plate repreſent a very ingenious improvement of the gorget by Dr Jeffray of Glaſgow; in which, beſides an alteration in the form of the gorget, a blunt and cutting

ting gorget, are very neatly connected together, as may be ſeen by the following explanation.

Fig. 1. Repreſents a double gorget with a ſpring, having the cutting gorget drawn back.

a, *a*, The handle. *b*, *b*, The blunt gorget, with *c*, its knob, whoſe ſpine runs, for ſome way, down on the blade. *d*, *d*, The cutting gorget. *f*, A ſlit, in the anterior end of the cutting gorget; on the right of this ſlit, the edge is ſharp; on the left, it is blunt. *g*, A thumb-piece. *h*, A flat ſpring paſſing down from the baſe of the cutting gorget into the hollow handle *a*, *a*. *k*, *k*, Two nails connecting the two gorgets together in a way afterwards deſcribed.

Fig. 2. Repreſents the ſame gorget, having the cutting gorget puſhed forward and prepared for the operation.

a, *a*, The handle. *b*, The blunt gorget with *c* its knob. *d*, The cutting gorget, with its ſharp edge projecting, and its ſlit receiving, and kept from moving to either

either ſide, by the ſpine of *c*. *e*, The thumb-piece raiſed.

Fig. 3. Part II. A back view of the gorget. *a*, The back plate, thin, and ſlightly convex, covering parts repreſented in the following figures.

Fig. 4. A front view of the blunt gorget. *a*, *a*, The metallic part of the handle, with holes in it for the ſcrew-nails that fix on it the hollow wooden part of the handle repreſented in fig. 5. *b*, The blade of the blunt gorget. *c*, A long ſlit in *b*, in which are two nails. *d*, *f*, *e*, The flat thin head, the ſcrewed point, aud the roller of theſe nails. *g*, *g*, Their heads, and reſting lightly on the blunt gorget. *h*, *h*, Their rollers, in the ſlit, on a level with the anterior ſurface of the blunt gorget, their diameter being ſomewhat leſs than the breadth of the ſlit, that they may turn, in the ſlit, eaſily on their nails. *i*, *i*, Their points. When the two gorgets are to be put together as in fig. 1. and 2. Part I., the back of the cutting gorget is applied to the face of the

the blunt one. The two rollers are laid in the ſlit of the blunt gorget over the two holes of the cutting gorget ſeen at *k*, *k*, fig. 1.; the nails are paſſed through the rollers and ſcrewed into the holes *k*, *k*, till their flat heads touch the back of the blunt gorget. The back plate is then ſcrewed on, covering the heads of the nails and the ſlit, making the back of the inſtrument ſmooth. Theſe nails therefore not only hold the two gorgets together, but with the ſpine on the knob of the blunt gorget permit the cutting gorget to move backwards and forwards only, while the rollers make that motion ſweet and eaſy. *k*, Another ſlit in the blunt gorget, in which the heel of the thumb-piece moves. It likewiſe is covered by the back plate.

Fig. 5. A back view of the cutting gorget. *a*, The wood in part of the handle hollowed out to receive *b*, the flat ſpring that is connected (fig. 1. and 2.) to the baſe of the cutting gorget, and terminates in a flat button-like head *c*.

d, The

d, The ſpiral ſpring, that ſurrounds the flat ſpring. One end of this ſpiral ſpring reſts againſt or may be fixed into the flat head of *b*; the other reſts againſt or may be fixed into *d*, *d*, the cheeks or anterior end of the groove in the wooden handle. *e*, *e*, The holes for the connecting and directing nails. *f*, The back of the thumb-piece connected by a tranſverſe ſcrew-nail to two projections from the back of the cutting gorget. *g*, *g*, Holes for the nails that connect the wooden and metallic parts of the handle together.—*N. B.* Both the cutting and blunt gorgets diminiſh a little in breadth from heel to point, by which the cutting gorget when puſhed forward is broader than that part of the blunt gorget immediately behind it. When, however, the cutting gorget is drawn back, it is narrower, and is defended by that part of the blunt gorget before which it lies.

From the figures and the deſcription of this inſtrument, the manner of uſing it will be underſtood. The ſurgeon holding

ing

ing it in his right hand as he does the common gorget, raiſes the thumb-piece, and applying his right thumb to it, puſhes forward the cutting gorget till the anterior connecting nail reaches the end of the ſlit, the button-like head of the flat ſpring, following the cutting gorget, compreſſes the ſpiral ſpring. The cutting edge now projecting, and the inſtrument being in every eſſential point like the common cutting gorget, is introduced into the bladder in the uſual way; but as ſoon as this is done, the ſurgeon, without taking his left hand from the ſtaff, or deranging his right hand, raiſes his right thumb; the cutting gorget is inſtantly drawn back, the thumb-piece falls down; and the gorget, now in every material article a blunt gorget, remains in the wound, preſenting a ſmooth ſurface, for conducting the finger or forceps, into the bladder, in queſt of the ſtone.

Plate LXXIV.

Fig. 1. An inſtrument invented by Dr Butter for injecting liquids into the bladder: *A A*, the handles of two thin plates of timber, which ſerve to compreſs a bladder placed between them, in which the liquor to be injected is contained. *B*, the ſtop-cock of a pipe, with which the bladder muſt be connected: And to the extremity of this ſhort pipe a larger tube *C* is adapted, to be inſerted into the urethra when the liquid is to be injected. Fig. 5. is a funnel for conveying the liquid into the bladder, by inſerting the ſmall end of it into the ſhort pipe near to *B*, on the tube *C* being removed.

Fig. 2. A peſſary for herniæ falling into the vagina: It may be made either of reſina elaſtica, ivory, or lignum vitæ.

Fig. 3. and 4. Two peſſaries for ſupporting the prolapſed parts in caſes of prolapſus uteri, and for compreſſing the urethra in incontinence of urine. Before being

ing introduced, they ſhould be immerſed in oil; and they ſhould be made to lie directly acroſs the vagina, ſo as to ſupport the prolapſed parts as much as poſſible. Theſe inſtruments may be made of any timber capable of receiving a fine poliſh: But much attention, I may remark, is neceſſary to this circumſtance; for unleſs they are perfectly ſmooth, they cannot be continued. Peſſaries tend to ſupport the relaxed parts better than any other remedy; but even poliſhed in the beſt manner, they are apt to excite ſo much irritation as to become altogether inadmiſſible.

Plate LXXV.

Fig. 1. and 2. Forceps of different ſizes for extracting ſtones from the bladder.—For a full grown adult they ſhould be ten inches long and proportionally ſtrong. Every operator ought to be furniſhed with three or four ſizes from thoſe of ten inches to ſuch as do not exceed ſeven. I have

already deſired, that the blades of the forceps may not meet when ſhut; otherwiſe they are apt to lay hold of the bladder: and for the ſame reaſon, their teeth ought not to be long. The hollow part of the blades ſhould be rough, by which they fix the ſtone with ſufficient firmneſs; but even this roughneſs ſhould be confined to within an inch of the point; for when it extends to the joint, ſmall ſtones are apt to fix in this part, and to dilate the blades of the inſtrument much more than they otherwiſe would do.

Fig. 3. Forceps with a ſmall curvature. When the forceps of the uſual form do not eaſily lay hold of a ſtone, ſuch as are ſomewhat crooked will ſometimes meet with it: In general, however, ſtraight forceps anſwer all the purpoſes of the others; and as ſtones, when laid hold of, are always more eaſily taken out with ſtraight forceps, they ſhould commonly be preferred.

Plate LXXVI.

Fig. 1. and 2. Different views of Frère Coſme's inſtrument for the operation of lithotomy. Fig. 1. Repreſents the inſtrument ſhut; and fig. 2. gives a view of it open.——The handle *A*, with which the niches *B* are connected, being kept in the ſituation repreſented in fig. 1., by the ſpring *C* being fixed in one of the niches, the knife is thus kept ſhut. But when the ſpring *C* is preſſed upon, ſo as to raiſe it out of the niche, as the handle *A* is made to move upon a pivot, it may now be turned; and the projecting part of it *D*, being turned fully round, if preſſure is now applied to *E*, it will raiſe the knife *F*, fig. 2., with which it is connected, to the elevation here repreſented.—The point *G* ſhould be made blunt and round, ſo as to run with eaſe and freedom in the groove of a ſtaff. The length of this inſtrument, including the handle, ſhould be ten inches.

The method of uſing it, is as follows: All the previous ſteps of the operation being finiſhed, and the urethra being cut in the manner I have directed in the lateral operation, the beak of the inſtrument *G* is to be conveyed into the groove of the ſtaff, and while ſhut puſhed into the bladder. The ſtaff is now to be withdrawn; and preſſure being applied to *E*, ſo as to elevate the knife *F*, it is now to be drawn out in ſuch a direction as to divide the proſtate gland laterally, when the forceps may be either introduced by running them in upon the fore-finger of the left-hand, or upon a blunt gorget employed for the purpoſe.

Various inſtruments of this kind have been invented; but this is the moſt ſimple, and in every reſpect, indeed, the beſt of any that I have ſeen. As the operation is ſtill performed with it in different parts of Europe, particularly in France, I think it right to repreſent it, but not with a view to recommend it.—The objections which occur to it are theſe: Although by the form

form of the handle the blade or cutting part of the inſtrument may be elevated to any neceſſary degree, yet this does not enſure the formation of a wound of a fixed and determined ſize. It has indeed been aſſerted by thoſe who think favourably of this inſtrument, that a wound of any determined ſize may be made with it; but this is by no means the caſe; and whoever will give it a trial will find, that the wound which it makes varies in ſize in every two that are cut with it, even with the blade at the ſame degree of elevation; for the cutting part of it is at ſuch a diſtance from the handle, that it is impoſſible for a ſurgeon always to withdraw it ſo ſteadily, as to cut uniformly in the ſame direction; and if in one caſe it is made to preſs more to one ſide than in another, the wound which it forms will not only be of a different ſize, but different parts may be cut by it.

But the moſt material objection to this inſtrument is, that it is apt to injure more of the bladder than ought to be cut. The

proſtate gland only, together with a ſmall portion of the neck of the bladder, ſhould be divided by this knife; but as it is always neceſſary to inſert the point to a conſiderable depth, before this can be done, the ſides and even fundus of the bladder are in this manner very apt to be injured.

The only advantage which this inſtrument is ſuppoſed to poſſeſs over the cutting gorget or director is, that being inſerted ſhut, and withdrawn open, only one cut is made in the parts through which it is made to paſs; whereas, it is alleged, that in the uſual method of employing the gorget or director, one inciſion is formed by the introduction of the inſtrument, and another when it is withdrawn. But, by attending to the directions that I have given in Chap. XXIX. this inconvenience, commonly attributed to the gorget, and conſequently to the director, may be always avoided; and as theſe inſtruments form a more free cut than the lithotome cachée, while they do not

not ſo readily injure any part of the bladder which ought not to be cut, they ſhould therefore be preferred.

Fig. 3. Forceps with a ſcrew *H* paſſing through their handles. When a ſtone is properly fixed in the forceps, various inventions have been propoſed for preſerving them in their ſituation; but thoſe that I have here repreſented are the beſt and the moſt ſimple of any that I have ſeen.

Plate LXXVII.

When treating of Lithotomy, in Chap. XXIX. I had occaſion to notice the riſk attending the extraction of a large ſtone; and when a ſtone proves to be ſo large as to give cauſe to ſuſpect that it cannot with ſafety be taken out entire, I have given it as my opinion, that it ſhould rather be broken into different pieces: For this purpoſe various inſtruments have been propoſed.——Fig. 1. repreſents forceps with long

long teeth, by which almoſt any ſtone may be broken.—By the ſcrew and lever connected with it, a much greater force may indeed be employed than will commonly be required:—Theſe forceps ſhould be twelve inches in length, and of a ſufficient firmneſs in every part, particularly in the joint, for bearing any force that may be needed.

Fig. 2. A ſcoop for extracting ſuch ſmall pieces of ſtone as cannot be taken out with common forceps.

Fig. 3. A ſilver canula for inſerting into the wound after the operation of lithotomy, for compreſſing ſuch arteries as lie too deep to be tied with ligatures. This tube ſhould be of a flat form: For a full-grown adult, an inch broad, and four inches in length; and before being introduced, it ſhould be covered with ſeveral plies of ſoft old linen. There ſhould be two holes in the brim of the inſtrument for connecting it by means of two pieces of tape to a circular belt round the body.

Plate LXXVIII.

Fig. 1. A jugum for compreſſing the penis, and it ſhould be made to ſit upon the parts without producing pain or uneaſineſs. It conſiſts of a piece of elaſtic ſteel lined with velvet or ſoft flannel. By means of the ſcrew *A*, it can be made wide or ſtrait at pleaſure; and the cuſhion *B* being placed upon the urethra, any neceſſary degree of preſſure may be made with it, by turning the ſcrew with which the cuſhion is connected. By means of this cuſhion and ſcrew, the preſſure is chiefly confined to the urethra; ſo that the circulation is ſcarcely interrupted through the reſt of the penis.

Fig. 2. A receptacle for the urine. It may be made either of tin, ſilver, or any other metal. It is ſomewhat convex on one ſide, with a concavity on the oppoſite ſide, fitted to the inſide of the patient's thigh. *D E*, Two tubes for fixing two pieces

pieces of tape, by which, when the penis is put into the neck of the inſtrument, it may be tied to a circular bandage round the body; and the tube *F* ſerves to fix a piece of tape for tying it round the thigh of the patient.

This inſtrument, when properly fitted, ſits eaſily, and has frequently proved uſeful to patients who could not retain their urine, and with whom the jugum, for the reaſons I have formerly enumerated, could not be employed.

A receptacle of this kind, of a ſize ſufficient to contain three or four gills, may be ſo adapted to the thigh as to admit of every neceſſary exerciſe.

Fig. 3. A bandage, originally invented by Mr Gooch, for retaining the rectum in prolapſus ani. *I*, a plate of elaſtic ſteel covered with ſoft leather, exactly fitted to the parts on which it reſts; and the cuſhion *K* ſhould be ſtuffed in ſuch a manner as to produce an equal and eaſy preſſure on being applied to the end of the gut after it is replaced. *H*, a ſtrap to be fixed with a buckle

buckle on the fore-part of the body above the pubes; and *G G*, two ſtraps connected with the upper part of the inſtrument, which, by paſſing over the ſhoulders, and being fixed by ſmall knobs on each ſide of the buckle, ſerve to retain it exactly in its place.

Fig. 4. A flat hook, for the purpoſe of elevating Poupart's ligament in operating for a crural or femoral hernia.

Plate LXXIX.

The three firſt figures of this Plate repreſent an apparatus delineated by the late very ingenious Mr John Hunter, for the application of cauſtic to ſtrictures in the urethra.

Fig. 1. A ſtraight ſilver canula, with a plug at the end of a ſilver-wire projecting beyond the end of it, ſo as to form a round knob: At the other end of the wire, is a ſmall port-crayon, in which is repreſented a piece of cauſtic.

Fig.

Fig. 2. A flexible canula for applying cauſtic to ſtrictures in the bend of the urethra. The wire, with the ſmall port-crayon, is puſhed out beyond its end.

Fig. 3. A piece of ſilver wire, with the plug at the end, to be introduced into the canula, as in fig. 1.

In uſing theſe inſtruments, fig. 1. or 2. with its projecting knob, is paſſed into the urethra till it comes in contact with the ſtricture, in which ſituation the tube is kept, and the wire being withdrawn, the port-crayon, with cauſtic fixed in it, is paſſed through the tube, and kept applied to the ſtricture as long as may be judged proper, when, on being pulled into the tube, the whole is withdrawn. I have elſewhere, however, endeavoured to ſhew, that little advantage is to be expected from this inſtrument, while much harm may be done by it *. Where ſtrictures are of the length of a third or fourth part of

* Vide Treatiſe on Gonorrhœa Virulenta, and Lues Venerea, by Benjamin Bell.

of an inch, as they often are, I conceive it to be impoſſible to remove them with cauſtic, while there is always ſome riſk, with whatever caution it may be managed, of the cauſtic breaking off and remaining in the urethra; as there alſo is, of our bringing the cauſtic into immediate contact with the ſound part of the urethra, inſtead of applying it directly to the ſtricture itſelf.

Fig. 4. A ſtraight ſilver canula, with a ſtilette, furniſhed with a ſharp trocar-point. Where ſtrictures are not more extenſive than the thickneſs of a ſheet of paper or two, but yet too firm to be paſſed with a bougie or common ſtaff, by paſſing the canula of this inſtrument till it comes in contact with the ſtricture, the ſtilette may then be eaſily puſhed through it, when the whole being withdrawn, a bougie may be inſerted, and the cure completed by a proper and continued uſe of bougies. By means of the ſmall holes and ſcrew-nail near the handle of the ſtilette, the length of the pointed part of this inſtrument

inſtrument is eaſily graduated; but I need ſcarcely obſerve, that even with this it requires to be uſed with great caution, and ought not to be employed but by thoſe who are much verſant in the treatment of obſtructions of the urethra.

Plate LXXX.

A tube of copper for conveying fumes of cinnabar to ulcers in the throat or noſe: *A B*, a box of copper, containing a heater of iron of the ſame form, and nearly of the ſame ſize, but ſomewhat leſs, that it may be eaſily put in and taken out: On this piece of iron, when red-hot, the cinnabar is put, and the cover *C D* with the tube *E F* attached to it, being ſcrewed upon the box *A B*, all the fumes muſt neceſſarily paſs through *F*, by which they may with eaſe be conveyed to any particular ſpot.

In operating for the fiſtula in ano with a probe-pointed biſtoury, when the parts

to

to be cut are thick, ſome difficulty is occaſionally experienced in paſſing the knob of the inſtrument through them: This, as I have elſewhere obſerved, may, with due care and attention, be eaſily overcome; but ſome who are not in the frequent practice of this operation, may do it more readily with the inſtruments, figs. 2. and 3. of this Plate, a very neat invention, for which, I am informed, we are indebted to the ingenious Mr Cruickſhank of London.

Theſe figures are in every other reſpect the ſame, only the one is ſtraight, and the other crooked; and fig. 2. gives a back view of the inſtrument; and fig. 3. a front view of it.

This inſtrument conſiſts of three principal or material parts. The handle *A B*. A probe-pointed biſtoury, *C D*, and a ſharp-pointed biſtoury, *D E*.

The ſharp-pointed biſtoury is made to ſlide ſmoothly upon the other, to which it muſt apply ſo cloſely, that the point *F*, fig. 1. may not be felt as it moves along,

and they are attached to each other by a ſcrew nail at *I*, fig. 3., paſſing through the ſlit *C* in the blunt biſtoury *C D* into the end of the ſharp-pointed biſtoury at *E*.

In operating, the fore-finger of the left hand is introduced into the anus. The inſtrument with the ſharp-pointed biſtoury drawn back as in fig. 2., is then paſſed into the ſinus till the blunt end of it *D* reaches the top of it, and is felt by the finger in the rectum: An opening is now to be made in the rectum with the ſharp-pointed biſtoury, which is done by preſſing it forward, by applying the fore-finger of the right hand to the knob *E*. This being done, and we know that the opening is completed by the finger in the rectum, the ſharp-pointed biſtoury is again drawn back, when the probe-pointed biſtoury *D*, being paſſed into the opening newly made in the rectum, the operation is finiſhed in the uſual way, as is done with the common biſtoury.

Plate LXXXI.

Fig. 1. A ſplint of timber, for a fractured leg, *A A*. Two loops for retaining leather ſtraps, as repreſented in the front view of the ſame ſplint in fig. 2. *C C*. *B*, an opening for receiving the external malleolus, when the leg is placed upon the outſide.

Figures 3, 4, 5, and 6. are perhaps the beſt ſplints hitherto diſcovered for fractures of any of the extremities. They may be made of different forms, but one or other of theſe will anſwer almoſt for any purpoſe: They are made by gluing a piece of thin timber, about the tenth part of an inch in thickneſs, upon leather. The timber is afterwards cut down to the leather, either with a fine ſaw or a knife ſet to a proper depth, in the manner repreſented in the figures.

Theſe ſplints are preferable to thoſe of paſteboard; for while they are longitudi-

nally perfectly firm, they are tranſverſely ſufficiently flexible for plying to the form of the limb. For the method of uſing them, I muſt refer to different parts of Sections IX. X. XI. and XII. of Chapter XXXIX.

Splints made in this manner have long been uſed by individuals; but Mr Gooch was the firſt who gave any deſcription of them.

Plate LXXXII.

In this plate I have delineated the inſtruments recommended by the late Mr Gooch, for preſerving a fractured thigh and leg in a ſtate of extenſion, as is mentioned more particularly in Volume VII. page 23., and which I ſhall deſcribe in his own words.

Fig. 1. A machine for extending a fractured leg. The tranſom to which the ſole is ſecured, is made to be opened and fixed by a pin; and the machine may occaſionally

caſionally be made wider, as appears by other holes in the tranſom; about which, on each ſide of the ſole, fillets are to be tied, coming from a dimity piece quilted for eaſe, and laced round the heel and inſtep, to make the extenſion upon the working of the ſcrews; but buff leather may poſſibly anſwer better for protecting the parts even than dimity.

Fig. 2. Shews the machine, and one of the ſplints in Plate LXXXI., together upon the limb.

Fig. 3. The longitudinal parts of the machine for the thigh are deſigned to move upon the circular plates; by which means it may be accommodated to limbs of different ſizes: And as there is a pin at each end of the circular plates, if the limb happens to be larger than ordinary, ſtraps of leather may be added.

Fig. 4. Shews the machine with the caſe upon the thigh.

Fig. 5. The key to work the ſcrews. There ſhould be two ſuch keys, that the

machine may occaſionally be wrought on both ſides at the ſame time.

Plate LXXXIII.

In Volume VII. page 23., I have obſerved, that ſome improvements had been made by the late Dr Aitken upon Mr Gooch's inſtruments, repreſented in the preceding plate, for extending fractured limbs: In this plate I have given a repreſentation of theſe improvements.

Fig. 1. Repreſents a machine for keeping the fragments of the thigh-bone in ſitu after being ſet, whether the fracture is ſimple or compound, on the neck or body of this bone. *A A A*, the upper circular which applies round the pelvis, like the top-band of a pair of breeches. It reſts on the ſame parts, and is fixed or buttoned in the ſame manner, by the ſtuds and correſponding holes *H*.

B B, Two ſoft-ſtuffed ſtraps fixed to the back part of this circular, of ſuch lengths

as

as to paſs between the thighs from behind forward, to tie round the fore-part of the ſame circular, by means of their forked extremities *C C*. Theſe effectually ſecure the circular from moving upward. There are two obſcure joints *K K*, in the back part of this circular, to facilitate its application; but it applies readily enough without them.

D D, The lower circular which fixes above the knee at the gartering place.

E E E, Three graduating ſteel ſplints which extend from the one circular to the other: Their upper extremities are fixed to the upper circular by vertible flat-headed ſtuds, ſimilar to thoſe at *F F*: Their lower extremities paſs through the iron ſcrew-plates *G*, firmly rivetted to the lower circular. The ſplints are provided with a number of impreſſions or holes, in which the ſcrew-nails which paſs through the plates are fixed. By puſhing the ſplints from below upward, the diſtance between the circulars is increaſed; and by turning the ſcrew-nails, it is maintained;

ed: Conſequently, that part of the thigh included between the circulars can be kept extended at pleaſure. The ſplints here are fixed for the right thigh; the pricked lines on the other ſide, ſhew how they may be accommodated for the left thigh, or for both at the ſame time.

The larger circular *A A A*, conſiſts of a piece of thick ſaddle-leather; all except its perforated part, and about a quarter of an inch on each edge, is covered on the inſide with a flexible thin iron plate, ſuch as is ſometimes uſed by tin-plate workers: Over this it is lined with the ſofteſt buff, or ſhamoy leather, between which and the plate a thin layer of hair or wool is interpoſed: The lining ought to project on both ſides half an inch or more, to prevent it in any degree from preſſing on the ſkin.

The ſmall circular *D D*, or inferior fixed point, is exactly ſimilar to the large one in ſtructure, the tin-plate excepted: which, on account of its ſmaller diameter, was found to be unneceſſary.

The

The breadth of the upper circular, when extended for an adult, may be from three to four inches: That of the under circular ſhould be in the ſame proportion.

The graduating ſteel ſplints *E E E*, muſt be ſufficiently long to extend from the upper circular to the lower, and to project over it about a hand-breadth: They require to be about four or five eighth parts of an inch broad, and about one-eighth part of an inch thick.

Fig. 2. A machine conſtructed on the ſame principle with fig. 1. for the retention of a fractured leg.

A A, A circular which applies below the knee-joint.

B B, Another which fixes at the ankles.

C C C, The graduating ſplints ſimilar to thoſe of the thigh-machine, both in conſtruction and action.

Fig. 3. A fracture-box mentioned in Vol. VII. page 64, as the invention of Mr James Rae, ſurgeon of this place, improved by Mr John Rae his ſon.

A, The ſole or baſe, which ſhould be a firm board, an inch and half thick. *B B*, the

the two ends which ſupport the ſide-beams *C C C C*. *D*, A braſs hinge, which, with a correſponding hinge on the other end of the machine, admit of the ends folding down ſo as to render it more portable than it otherwiſe would be. *L L*, Two parallel grooves for receiving two projecting parts of the correſponding end of the machine, by which the ſame inſtrument may be extended or ſhortened ſo as to fit any length of member. *E E E E*, Two lateral beams, which by the holes in their extremities, will ſerve for any length to which the inſtrument may be extended: And by a pin at each end paſſing through the holes in the end beams, any one of the ſides, or both of them, may be raiſed at pleaſure.

G G G G, &c. Twelve or fourteen buckles on each ſide of the machine, with correſponding pieces of girth two inches broad, on which the member is ſupported by buckling them exactly to the form of the limb. *H I*, *H I*, Two ſtraps, with correſponding buckles for fixing the baſe of

of the machine to the bed. The limb is fixed to the machine by two ſtraps and buckles, one fixed at each end.

The advantages of this inſtrument are, that in compound fractures the ſores can be inſpected and dreſſed without deranging or moving any part of the limb, merely by removing ſuch of the ſtraps as are oppoſite to the ſores. Inſtead of a twelve or eighteen-tailed bandage of the common form, ſeparate pieces of flannel ſhould be uſed; ſo that ſuch of thoſe as are wet with the diſcharge can be eaſily moved without touching the reſt.

In this manner ſores may be daily dreſſed without being moved till a cure is accompliſhed, while the limb may be raiſed to any angle, by heightening one or other of the ends of the lateral beams by means of the holes and pins at each end.

Plate LXXXIV.

Fig. 1. A machine for retaining the different parts of a fractured patella.

A,

A, a ſtrap to be fixed by means of the buckle at one end on the upper part of the leg immediately below the knee. *B*, a ſimilar ſtrap to be fixed above the knee.

Fig. 2. a back view of the ſame machine. *F*, a ſemilunar compreſs of cork covered with ſhamoy leather, to be placed immediately above the upper part of the patella. *G*, a ſimilar compreſs for ſupporting the inferior part of the bone.

Theſe compreſſes being properly placed, may be drawn to any degree of tightneſs by means of the ſtraps and buckles *C D E*.

Fig. 3. A limb with a fractured patella, and the bandage fig. 1. applied to it. In this figure the ſtrap *H* is added to it: Being fixed to the point of the ſhoe, and connected with one of the buckles above the knee, the limb is thereby kept extended; by which there is no riſk of the fractured parts of the patella being forcibly pulled from each other, as would neceſſarily happen were the limb to be ſuddenly bent before the cure ſhould be complete.

Plate LXXXV.

Fig. 1. A fractured limb dreſſed with an eighteen-tailed bandage, and laid upon the outſide with the knee bent.

Fig. 2. A fractured limb with an eighteen-tailed bandage, and one of the flexible ſplints in Plate LXXXI. There is alſo placed beneath the limb a firm unyielding ſplint, ſuch as is repreſented in the ſame Plate, fig. 2.

Plate LXXXVI.

I have here delineated a fracture box, mentioned in Vol. VII. page 40.

Fig. 1. *A A*, The baſe or bottom of the box, formed of deal an inch and half thick. *B B*, Two ends riſing from the baſe, and terminating in the pillars *C C C C*. *D D*, An excavated moveable piece of timber for ſupporting the fractured limb. This moveable part of the inſtrument may be raiſed and ſupported at any height by the pins *E E* paſſing through the holes in the

the pillars *CCCC;* and it may at pleaſure be raiſed at one end and depreſſed at the other.

HH, Two ſtraps connected with buckles on the oppoſite ſide for fixing the limb after it is properly placed. Before laying down the leg, the dreſſings ſhould be all applied, and the excavated board ſhould be completely lined with ſoft wool. *G,* a hole for receiving the heel to prevent it from being hurt when the leg is ſtretched out in the manner repreſented in fig. 2.

The ends, *B B,* may either be fixed to the baſe of the inſtrument, or, in order to render it more portable, they may be made moveable, and fixed for uſe by a double pin at each end, *F.*

Plate LXXXVII.

As the ſplints uſed by Mr William Sharpe are ſtill preferred by ſome practitioners, I have given a repreſentation of them in this Plate.

Theſe ſplints, figs. 3. and 4. are formed of ſtrong paſteboard made with glue; and

and are fixed upon a fractured leg with three ſtraps which ſurround the whole.

Fig. 4. repreſents an under ſplint of an irregular form, ſuitable to that part of the leg which it is meant to cover: It is a little convex externally, and concave internally. The length for a middle-ſized man, eighteen inches from *E* to *E*; the width, two inches and three quarters at the ſtrap near the knee, and two inches and a quarter at both the other ſtraps.

D F, *D F*, *D F*, three leather ſtraps from fifteen to twenty inches long, and one inch wide, having two rows of holes ſo placed, that every hole in each row may be oppoſite to a ſpace in the other. Theſe muſt be ſewed faſt to the middle and outſide of the under ſplint. The portions of ſtraps *D D D*, on the anterior part of the ſplint, muſt be ſhorter than thoſe on the poſterior, *F F F*, which are to ſurround the more muſcular part of the leg.

G, A part to ſupport the foot from the point *E* to the heel *H*, five inches long at an angle of ſixty degrees.

C,

C, The foot ſtrap, twelve inches long, ſewed to the bottom of the under ſplint, within two inches of the point, to paſs under the heel, and through the leather loop *B* on the upper ſplint, to be fixed to the loweſt pin *A*, in fig. 3.

I, An irregular oval hole, two inches long, and almoſt one wide in the loweſt part, but decreaſing upwards, to receive the maleolus externus, or lower extremity of the fibula.

Fig. 2. Repreſents the leg raiſed up, to ſhew the ſituation of the under ſplint, when properly applied.

Fig. 3. The upper ſplint. *A A A*, The pins upon which the ſtraps of the under ſplint are to be fixed, by means of the holes *D D D*, *F F F*. *B*, The leather loop for receiving the foot-ſtrap *C*, in fig. 4.

Fig. 1. Repreſents a fractured leg when laid within the ſplints, having the foot of a ſtocking and a ſhoe fixed on it.